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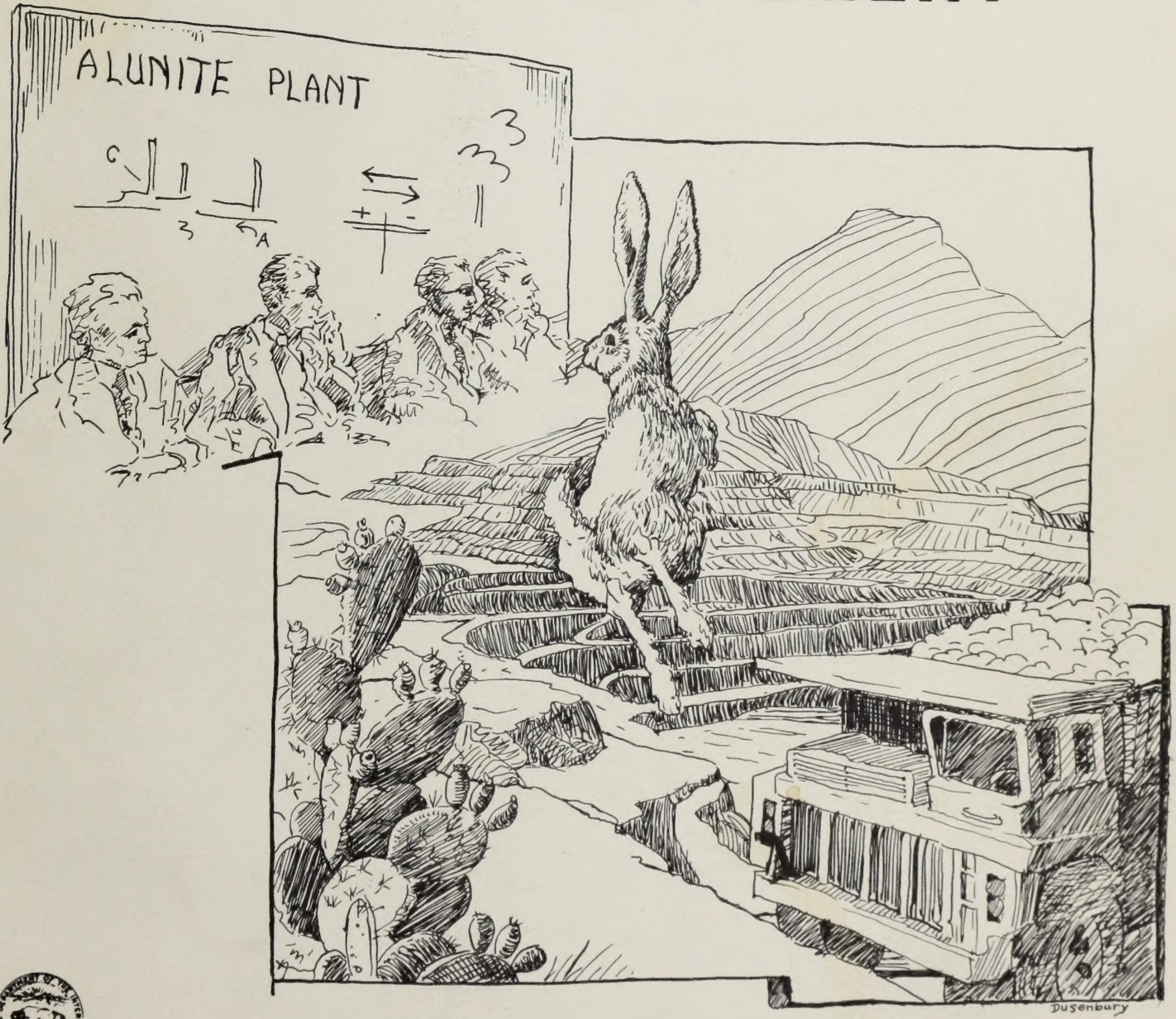
FINAL ENVIRONMENTAL STATEMENT



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Bureau of Land Management

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FINAL

ENVIRONMENTAL STATEMENT

Proposed

ALUNITE PROJECT

United States Department of the Interior

Bureau of Land Management

(   )

Curt Berklund

Director
Bureau of Land Management

BUREAU OF LAND MANAGEMENT
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SUMMARY

Draft ( ) Final (x) Environmental Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: Administrative (x) Legislative ( )

2. Brief Description of Action: The proposed action is the development of an alunite mine and processing plant complex in Beaver County, Utah for the annual production of 500,000 tons of alumina, 370,000 tons of potassium sulfate fertilizer, up to 1.7 million tons of phosphate fertilizers, and up to 20,000 tons of aluminum fluoride. Approximately 4 million tons per year of alunite ore and up to 1.525 million tons per year of phosphate rock from Idaho would be utilized in the process. Major components of the proposed action would be the 240-acre open pit alunite mine and 175-acre waste rock pile, the 150-acre processing plant complex including 75-megawatt power plant, tailings ponds covering 1,250 acres, a 20-mile railroad spur and 9-mile access highway, a water well field, and other support components such as service roads, material sites, and communication facilities. Construction of the proposed project would require 42 months with an average work force of 1,200 employees. Operation of the mine and processing plant would require approximately 1,000 employees during the 25-year project life.

3. Summary of Environmental Impacts: The proposed action would result in socioeconomic impacts to the communities of Milford, Minersville, Beaver, and Cedar City. Atmospheric emissions of particulates, sulfur oxides, nitrogen oxides, and fluorides would result in deterioration of air quality. The proposed project would meet Federal Primary Ambient Air Quality Standards (Class III) but would exceed existing Class II standards. The project area would have to be designated as Class III under the Prevention of Significant Deterioration Regulations. Construction and operation of the mine and processing plant would result in varying degrees of damage to soil, vegetation, wildlife habitat, aesthetic values, land productivity, and cultural resources on 2,409 acres during the 25-year project life.

4. Alternatives Considered

   A. Alternative leasing considerations
   B. Alternative initial mining locations within the lease area
   C. Alternative processing plant design
   D. Alternative ore transport
   E. Alternative power source
   F. Alternative processing plant sites
   G. Alternative road system
   H. Alternative communications
   I. Alternative land acquisition by applicants

5. Comments Have Been Requested From the Following: Following is a list of federal, state, and local agencies with jurisdiction and expertise that received copies of the draft statement. Comments were received from those agencies indicated by an asterisk.

   Federal Agencies
   Department of the Interior
     *Bureau of Reclamation
     *Bureau of Indian Affairs
     *Bureau of Outdoor Recreation
     *Fish and Wildlife Service
     *Geological Survey
     *National Park Service
     *Bureau of Mines
     *Mining Enforcement & Safety Admin.
     Office of the Solicitor
   Department of Agriculture
     Forest Service
     *Soil Conservation Service
   *Environmental Protection Agency
   *Dept. of Health, Education & Welfare
   *Department of Commerce
     *National Oceanic & Atmospheric Admin.
   *Federal Aviation Administration
   *Department of Transportation
   *Federal Energy Administration
   *Department of Housing and Urban Development
   Department of Labor
     Occupational Safety & Health Admin.

   State of Utah
   Office of State Planning Coordinator

   Local Agencies
   *Beaver County Commission
   City of Milford, Utah
   City of Minersville, Utah
   City of Beaver, Utah
   Iron County Commission
   City of Cedar City, Utah
   *Beaver County Planning & Dev. Council
   Five County Assn. of Governments

6. Date Statement Made Available to C.E.Q. and the Public:

   Draft: October 15, 1976
   Final:

TABLE OF CONTENTS

CHAPTER 1 - DESCRIPTION OF PROPOSED ACTION

Page No.

INTRODUCTION 1-1

HISTORY AND BACKGROUND 1-1

FEDERAL ACTIONS REQUIRED 1-4
  Bureau of Land Management 1-4
  U.S. Geological Survey 1-7
  Federal Communications Commission 1-7
  Environmental Protection Agency 1-7
  Federal Energy Administration 1-7

STATE ACTIONS REQUIRED 1-7
  Utah State Division of Lands 1-8
  Utah State Engineer 1-8
  Utah State Division of Health 1-8
  Utah Division of Oil, Gas, and Mining 1-9

ACTIONS PROPOSED BY APPLICANT 1-9
  Purpose and need 1-9
  Location of all components 1-12
  Mineral lease area 1-14
  Implementation schedule for components 1-14

DEFINITION OF COMPONENTS OF APPLICANT'S PROPOSAL 1-18
  Alunite mine 1-18
  Processing plant complex 1-31
  Waste disposal - tailings ponds 1-60
  Solid waste 1-66
  Water system 1-67
  Transportation system 1-70
  Ore conveyor system 1-75
  Sand and gravel sources 1-75
  Basalt quarry 1-76
  Communications facilities 1-76
  Summary of land requirements for proposed project 1-77
  Fuel requirements 1-78
  Labor force 1-80
  Monitoring program 1-83
  Data summary and analysis guidelines 1-89

INTERRELATIONSHIPS WITH OTHER PROJECTS AND PROPOSALS 1-96
  Geothermal development 1-96
  Phosphate mine 1-99

CHAPTER 2 - DESCRIPTION OF THE ENVIRONMENT - ALUNITE PROJECT AREA

Page No.

INTRODUCTION 2-1

CLIMATE 2-2
    Regional setting and project site 2-2

AIR QUALITY. 2-16
    Regional setting and project site 2-16

TOPOGRAPHY 2-21
    Regional setting 2-21
    Project site 2-21

GEOLOGY 2-22
    Regional setting 2-22
    Project site 2-22

HYDROLOGY 2-31
    Regional setting 2-31
    Project site 2-44

SOILS 2-44
    Regional setting 2-44
    Project site 2-47

VEGETATION 2-48
    Regional setting 2-48
    Project site 2-54
    Threatened and endangered species 2-57

WILDLIFE AND WILD HORSES 2-58
    Regional setting 2-58
    Project site 2-62

CULTURAL RESOURCES - HISTORY AND ARCHAEOLOGY 2-63
    Regional setting 2-63
    Project site 2-64

AESTHETICS 2-69
    Regional setting 2-69
    Project site 2-70

LAND USE 2-71
    Regional setting 2-71
    Project site 2-78

SOCIOECONOMIC CONDITIONS 2-84
  Introduction 2-84
  Population 2-87
  Employment and economic base 2-89
  Income 2-94
  Infrastructures 2-98
  Government and taxation 2-108
  Quality of life 2-109

LAND USE PLANS AND CONTROLS 2-115
  Federal agencies 2-115
  State of Utah 2-116
  Local 2-116

FUTURE ENVIRONMENT WITHOUT PROJECT 2-117

CHAPTER 3 - THE PROBABLE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Page No.

INTRODUCTION 3-1

CLIMATE. 3-2

AIR QUALITY 3-2
  Stack emissions 3-3
  Pollution dispersion modeling 3-9
  Potential impacts of fluoride emissions 3-10
  Ozone 3-12
  Fugitive dust 3-13
  Visibility 3-13
  Odor 3-15
  Summary 3-16

TOPOGRAPHY 3-16

GEOLOGY 3-18

HYDROLOGY 3-18
  Ground water 3-18
  Surface water 3-26

SOILS 3-29

VEGETATION 3-33

WILDLIFE AND WILD HORSES 3-36

CULTURAL RESOURCES 3-42
    Historical resources 3-42
    Archaeological resources 3-42

AESTHETICS 3-45

LAND USE 3-49
    Recreation 3-49
    Agricultural 3-54
    Transportation 3-57
    Urban/residential land use 3-58

SOCIOECONOMIC CONDITIONS 3-59
    Population 3-59
    Employment and economic base 3-64
    Income 3-67
    Infrastructures 3-76
    Government and taxation 3-77
    Quality of life 3-78

LAND USE PLANS AND CONTROLS 3-81
    Local land use plans and controls 3-81
    State land use plans and controls 3-82
    Federal land use plans and controls 3-82

CHAPTER 4 - MITIGATING MEASURES NOT INCLUDED IN THE PROPOSED ACTION

Page No.

INTRODUCTION 4-1

MEASURES COMMITTED BY FEDERAL AGENCIES 4-2

MEASURES COMMITTED BY STATE AND LOCAL AGENCIES 4-5
    General mitigation 4-5
    Highway 4-5
    Water supply 4-5
    Sewage systems 4-6
    Education 4-6
    Public safety 4-6
    Primary medical care 4-6
    Housing 4-6

MEASURES COMMITTED BY THE APPLICANT 4-7

EVALUATION OF MITIGATING MEASURES 4-8
    Air quality 4-9
    Topography 4-9

Hydrology 4-9
Soils 4-9
Vegetation 4-11
Wildlife and wild horses 4-12
Cultural resources 4-12
Aesthetics 4-13
Land use 4-14
Socioeconomic conditions 4-14
Land use plans and controls 4-16

CHAPTER 5 - ANY ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

Page No.

INTRODUCTION 5-1

AIR QUALITY 5-1
  Emissions from processing complex 5-2

TOPOGRAPHY 5-6

HYDROLOGY 5-7
  Ground water 5-7
  Surface water 5-9

SOILS 5-11

VEGETATION 5-12

WILDLIFE AND WILD HORSES 5-13

CULTURAL RESOURCES 5-15
  Historical resources 5-15
  Archaeological resources 5-15

AESTHETICS 5-17

LAND USE 5-19
  Recreation 5-19
  Agricultural 5-21
  Transportation 5-23
  Urban/residential land use 5-23
  Mineral development 5-23

SOCIOECONOMIC CONDITIONS 5-24
  Population 5-24
  Employment 5-24

Infrastructures 5-24
Quality of life 5-27

LAND USE PLANS AND CONTROLS 5-34

CHAPTER 6 - REALTIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Page No.

INTRODUCTION 6-1

AIR QUALITY 6-4

WATER RESOURCES 6-5

SOILS 6-6

MINERALS 6-7

VEGETATION 6-8

WILDLIFE AND WILD HORSES 6-10

CULTURAL RESOURCES 6-11

LAND USE 6-11
Recreation 6-11
Agriculture 6-12

SOCIOECONOMICS 6-13

CHAPTER 7 - IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Page No.

INTRODUCTION 7-1

MATERIAL REQUIREMENTS 7-1

AIR QUALITY 7-2

WATER RESOURCES 7-3

ENERGY RESOURCES 7-3

MINERALS 7-4

LOST PRODUCTION 7-5

CULTURAL RESOURCES 7-6

AESTHETICS 7-6

LAND USE 7-7

LOSS OF LIFE 7-8

SOCIOECONOMICS 7-9

CHAPTER 8 - ALTERNATIVES TO THE PROPOSED ACTION

Page No.

INTRODUCTION 8-1

ALTERNATIVE LEASING CONSIDERATIONS 8-2
    Grant lease with standard stipulations 8-2
    Lease with appropriate modifications and/or stipulations . . . 8-3
    Grant lease in part 8-3
    No action alternative (Denial of application) 8-4
    Legislation to deny 8-5

ALTERNATIVE INITIAL MINING LOCATIONS WITHIN THE LEASE AREA 8-5

ALTERNATIVE PROCESSING PLANT DESIGN 8-6
    Alternative of beneficiation and calcination of phosphate rock at alunite processing complex 8-7
    Alternative of not producing phosphate fertilizers 8-11

ALTERNATIVE ORE TRANSPORT 8-12

ALTERNATIVE POWER SOURCE 8-14
    Geothermal power production 8-14
    New transmission line (138 kV) 8-14
    Mitigating measures 8-28
    Evaluation of mitigating measures 8-31
    Unavoidable adverse impacts 8-32

ALTERNATIVE PROCESSING PLANT SITES 8-34
    Introduction 8-34
    Alternative plant site 1 8-35
    Alternative plant site 2 8-39

Alternative plant site 3 8-43
Summary of alternative plant site analysis 8-48

ALTERNATIVE ROAD SYSTEM 8-51

ALTERNATIVE COMMUNICATIONS 8-56

ALTERNATIVE LAND ACQUISITION BY APPLICANTS 8-57

CHAPTER 9 - CONSULTATION AND COORDINATION

Page No.

INTRODUCTION 9-1

HISTORY OF CONSULTATION AND COORDINATION 9-1

ORGANIZATION OF THE INTERAGENCY TEAM 9-3

INTERAGENCY AND PUBLIC CONTACT ACTIVITIES 9-4
Federal contacts 9-4
State contacts 9-6
Local contacts 9-7
Public meetings 9-7

COORDINATION IN REVIEW OF THE DRAFT STATEMENT 9-8
Federal agencies 9-8
State agencies 9-9
Local agencies 9-9
Nongovernment organizations 9-9
Public hearings or meetings 9-12

PUBLIC REVIEW OF THE DRAFT ENVIRONMENTAL STATEMENT 9-13
Written comments 9-13
Public hearings 9-86

REFERENCE MATERIAL

APPENDIX A - Description of Soil Associations . . . . .8 pages

APPENDIX B - Regional Plant Species List . . . . .8 pages

APPENDIX C - Regional Animal Species List . . . . 10 pages

APPENDIX D - Alunite Planning and Development Council Statement . . . . .15 pages

LIST OF ABBREVIATIONS . . . . 2 pages

REFERENCES CITED . . . . 5 pages

PREFACE

The Bureau of Land Management (BLM) is preparing this Environmental Statement (ES) in compliance with the National Environmental Policy Act of 1969, Public Law 91-190, to present a full disclosure of actions proposed by the Alumet Company. Alumet is a general partnership formed by Earth Sciences, Incorporated, National Steel Corporation, and Southwire Company to pursue the development of the alunite deposits. The Bureau of Mines and U.S. Geological Survey participated in the preparation of the Draft Environmental Statement by providing interdisciplinary team members. The ES will define and analyze expected environmental impacts, possible mitigation of impacts, and alternatives to the proposal. This final ES will provide the Department of the Interior a comprehensive basis for analysis and decision making.

The Alumet Company proposes to lease national resource lands under the Mineral Leasing Act to mine the potassium-bearing mineral, alunite. The total lease area would provide ore for 100 years of operation at the proposed level of development. A detailed mining plan has been submitted for a portion of the total lease area which would provide ore for 25 years. All components of the applicant's proposal are based on the initial mining period of 25 years. The proposed project site is located approximately 30 miles west and southwest of Milford, Utah.

A processing plant complex would be constructed on 5,298 acres of land adjacent to the alunite ore body. This land is currently under BLM management and Alumet has asked the Utah Division of State Lands to acquire the lands from BLM on an exchange basis. The State of Utah would then sell or lease the land to Alumet.

The alunite mine would produce approximately 4 million tons of alunite ore each year. Open pit mining techniques would be used. A conveyor would transport the alunite ore approximately 6.6 miles to the processing plant site.

The alunite ore would be processed to produce alumina, potassium sulfate, and sulfuric acid. Alumina is the source material for aluminum; potassium sulfate is an agricultural fertilizer. Sulfuric acid would be used to treat phosphate rock to be transported from Idaho by rail to the processing plant for the production of phosphate fertilizers. A small quantity of aluminum fluoride, which is used in the aluminum smelting industry, would also be produced. All electrical power requirements would be supplied by a 75-megawatt coal-fired power generation plant located at the processing plant complex. Water would be supplied from a well field that would be developed adjacent to the processing plant complex. Other major components of the processing plant complex would include tailings ponds for disposal of solid and liquid wastes, office and maintenance buildings, cooling and water reclaim ponds, sewage lagoons, and a sanitary landfill site.

Primary access to the processing plant would be provided by a 9-mile paved highway from Utah Highway 21. A 20-mile railroad spur is proposed to connect the processing plant with the Union Pacific Railroad near Thermo Siding.

All production materials, phosphate rock, and coal for the power generation plant would be transported by rail. Fuel oil and diesel fuel from local sources would be transported by truck. The alumina, potassium fertilizer, phosphate fertilizer, and aluminum fluoride produced would be shipped by rail. The alumina and aluminum fluoride may be sold to existing aluminum smelters in the Northwest. The fertilizer products would be sold in both domestic and foreign markets.

An average of 1,200 workers would be required during the 42-month construction period. Operation of the processing plant and alunite mine would require approximately 1,000 workers.

The purpose of this statement is to evaluate the impacts associated with the proposed development. Proposed federal actions to be considered are: granting preference right leases for potassium; granting rights-of-way for roads, utilities, and railroads; and exchange of national resource lands with the State of Utah for use as a processing plant site.

CHAPTER 1

DESCRIPTION OF PROPOSED ACTION

CHAPTER 1

DESCRIPTION OF THE PROPOSED ACTION

INTRODUCTION

Chapter 1 includes a discussion of government actions which would be required if the proposal is approved. These actions include: granting mineral leases, granting rights-of-way, issuance of licenses and permits, and review and approval of plans. A discussion of related projects is also included. The applicant's proposal, including the purpose and need for the project, and a description of the components of the project, is presented here. Only components of the project which would significantly affect the quality of the human environment are described in detail.

HISTORY AND BACKGROUND

In the mid-1960s, Earth Sciences, Inc. (ESI) began investigating domestic alternatives for foreign bauxite. Bauxite is the traditional raw material from which alumina is made. Although chemical processing technology could extract alumina from all of the many materials being studied, and several processes were under investigation by the Bureau of Mines, specific information on relative economics was not available. In 1969, ESI initiated studies on the mineral alunite. At that time, the only known alunite-to-alumina processing plant was located in the Soviet Union.

Available literature indicated that alunite reserves in the United States were minor; field studies by ESI suggested otherwise. In the summer and fall of 1970, geologic investigations by ESI indicated possible large deposits of alunite near Milford, Utah. Potassium prospecting permits were issued by BLM to ESI during the summer of 1971 for nearly 17,000 acres in the discovery area. The U.S. Geological Survey was responsible for approving and supervising the prospecting activities.

Special Land Use Permits were issued by BLM to ESI from 1972 to 1975 to allow investigation of ground water resources, to test soil and bedrock characteristics, and to construct and operate two atmospheric monitoring stations.

After reconnaissance work had suggested the extent and potential importance of the alunite deposits, ESI joined forces with National Steel Corporation and Southwire Company in a partnership to develop the deposits. This partnership is known as Alumet. Since that time, test drilling has verified major reserves in the initial discovery area. Exploration in other areas of the western United States has resulted in the discovery of additional deposits.

Based on the intensive exploration of the initial discovery area, Preference Right Lease Applications were made by ESI in April 1973 for 11,336 acres and in May 1973 for an additional 2,492 acres. The Technical Examination and Environmental Analysis Report completed by BLM in January 1974 showed a need to prepare an Environmental Impact Statement on the proposal.

In December 1974, the applicant submitted the original Environental Impact Assessment which was reviewed by an interdisciplinary team from

BLM and other federal and state agencies. As a result of questions raised in this review, applicant responded with several additional submissions.

The Preparation Plan for the Alunite Environmental Impact Statement was approved in October 1975. The Cedar City Environmental Project Office was assigned statement preparation responsibility. The draft statement was approved for printing by the Department of the Interior on September 8, 1976 and the statement was filed with the Council on Environmental Quality on October 15, 1976. Approximately 450 copies were distributed to the public and other agencies for review and comment. Public hearings were held November 30, 1976 in Milford, Utah and December 1, 1976 in Salt Lake City, Utah.

Applicant has presented detailed plans for mining about 350 acres of the 13,828 for which application has been received. Discussion in this statement is limited to environmental impacts which would be caused by mining on the 350 acres plus attendant facilities. However, analyses and data developed in the statement will apply to the entire area and will be used in any future analysis necessitated by subsequent application.

Except for coal (Fuel Requirements) and phosphate rock (Interrelationships With Other Projects), definite sources of raw material (Raw Material Requirements) have not been established and an evaluation of potential impacts is not possible. However, because of the relatively small quantities involved and the fact that there are existing sources, the applicant proposes to purchase these materials on the open market and significant impacts are not expected.

FEDERAL ACTIONS REQUIRED

Certain specific actions taken by the following listed federal agencies would be required prior to initiation of this project.

The Bureau of Land Management.

1. Grant potassium preference right leases under authorities and regulations of the Secretary of the Interior.

The Secretary of the Interior is authorized by law, Act of February 25, 1920 [41 Stat. 437; 30 USC 181 et. seq.], as ammended by the Act of February 7, 1927, [44 Stat. 1057; 30 USC 281-287] to dispose of certain minerals including potassium, to citizens, associations of citizens of corporations organized under the laws of the United States.

The Secretary grants, under rules and regulations he may prescribe, a prospecting permit which gives the exclusive right to prospect for the sought after mineral. Upon showing to the satisfaction of the Secretary of the Interior that a valuable deposit of potassium has been discovered within the area of the permit and that such land is chiefly valuable therefore, the Secretary must grant a lease for any or all of the land embraced in the prospecting permit.

Under Regulations 43 CFR 3520 promulgated by the Secretary of the Interior on May 7, 1976, the authorized officer shall issue a lease to the holder of the prospecting permit if the permittee shows he discovered a valuable deposit of the mineral for which the permit was issued. The authorized officer may not issue a lease unless the permittee also shows that the land is chiefly valuable for the development of the mineral deposit discovered.

Prior to issuance of a lease, the valuable deposit test must be met for the land in each permit. In the determination of "valuable deposit" the permittee must submit sufficient evidence to show there is reasonable expectation that his revenues will exceed the costs of developing, extracting, removing and marketing the mineral including the costs of complying with existing government regulations, reclamation and environmental standards and proposed lease terms.

2. Exchange 5,298 acres of national resource lands for "equal value" lands owned by the State of Utah. The State of Utah would sell or lease these acquired lands to the applicant for use as a processing plant and tailings pond complex. (Subsections (c) and (d) of Section 8 of the Act of June 28, 1934 [48 Stat. 1272, as amended, (43 USC Sec. 315g)] authorizes the Secretary of the Interior to exchange lands.)

3. Grant a 100-foot wide tramroad right-of-way for the cross-country conveyor and adjacent mine access road running from the mineral lease area across 4.9 miles of national resource lands to the processing plant complex, and grant a 100-foot wide tramroad right-of-way for the railroad spur and adjacent access road from the existing railroad near Thermo Siding across 14.0 miles of national resource lands to the processing plant complex. (The Act of October 21, 1976 [90 Stat. 2776; 43 USC 1761] authorizes the Secretary of the Interior to permit the use of rights-of-way for tramways over national resource lands.

4. Grant a 100-foot wide right-of-way for water pipelines, including service roads and electrical power lines from the water well

locations across 12.0 miles of national resource lands to the processing plant complex. (The Act of October 21, 1976 [90 Stat. 2776; 43 USC 1761] authorizes the Secretary of the Interior, under such regulations as he may fix, to permit the use of rights-of-way through public lands for water pipelines, and associated service roads and utilities.)

5. Grant a 50-foot wide tramroad right-of-way for the road from the processing plant to the basalt quarry across approximately 1 mile of national resource lands. (The Act of October 21, 1976 [90 Stat. 2776; 43 USC 1761] authorizes the Secretary of the Interior to permit the use of rights-of-way for tramways over national resource lands.)

6. Sell approximately 600,000 cubic yards of sand and gravel for use in building roads and as aggregate in concrete. (The Act of July 31, 1947, as amended, authorizes the Secretary of the Interior to dispose of mineral materials at fair market value for commercial purposes.)

7. Sell approximately 110,000 cubic yards of basalt rock for use as railroad base. (The Act of July 31, 1947, as amended, authorizes the Secretary of the Interior to dispose of mineral materials at fair market value for commercial purposes.)

8. Grant a communication site right-of-way for a microwave repeater site and easements for the necessary service road and utilities across 2.0 miles of national resource lands. (The Act of October 21, 1976, [90 Stat. 2776; 43 USC 1761] authorizes the Secretary of the Interior to grant rights-of-way for communication purposes.)

The U.S. Geological Survey. Approve a mining plan and administer the operation of the potassium leases at the alunite mine. (Sec. 32 of the Act of February 25, 1920, [41 Stat. 450; 30 USC 189]; Sec. 10 of the Act of August 7, 1947, [61 Stat. 915; 30 USC Part 359]; authorizes the Secretary of the Interior to prescribe the necessary and proper rules and regulations to promote the mining of leasable minerals.)

The Federal Communications Commission. Grant a license for construction of a microwave repeater station approximately 6 miles west of the processing plant complex. (The Act of June 19, 1934, as amended, [48 Stat. 1082; 47 USC 303] authorizes the Commission to regulate communications by wire and radio so as to make available to all people a rapid and efficient nationwide and worldwide communication service.)

The Environmental Protection Agency. Delegate authority to the Utah Air Conservation Committee for the new source review under the Federal Regulations for Prevention of Significant Deterioration of Air Quality (40 CFR 52.12).

Federal Energy Administration. Require the applicant to submit form FEA C-603-S-0 (Section 2 [a and b] of the Energy Supply and Environmental Coordination Act of 1974 [P.L. 93-319] requires the submission of this information for major fuel burning installations.)

STATE ACTIONS REQUIRED

The following listed agencies of the State of Utah would also be required to take various actions prior to initiation of this project:

The Utah State Division of Lands.

1. Complete exchange of state lands for national resource lands for the proposed processing complex. The state would either sell or lease these lands to the applicant.

2. Grant a right-of-way for the railroad spur from the processing plant to Thermo Siding across approximately 3 miles of state land. The applicant has not made formal application to the state for this right-of-way and the proposed width is not available.

Grant a right-of-way for a water pipeline together with associated service roads and power lines in Wah Wah Valley across 2 miles of state lands. The applicant has not made formal application to the state for this right-of-way and the proposed width is not available. (The Utah Code Annotated 1953, as amended 65-2-1, states that the State Land Board may grant rights-of-way on, through, and over any state lands.)

The Utah State Engineer. Amend Alumet's water appropriation to permit an annual use of 32 acre-feet of ground water in the Wah Wah Valley drainage basin for the proposed alunite mining operation. Water has already been appropriated to be diverted in the area of the proposed processing plant by the state.

The Utah State Division of Health. Issue permits for each component part of the processing complex relating to pollution production and control (The Utah Code Annotated 1953, as amended, Chapter 24-26). Also, solid and liquid waste disposal plans, domestic water facilities and construction camp plans would be approved (Utah Code Annotated 1953, as amended, Title 26).

Following authorization from the Environmental Protection Agency, the Utah Air Conservation Committee would redesignate the proposed project site as a Class III area and would issue a construction permit in compliance with the Prevention of Significant Deterioration Regulations. This prevention of significant deterioration review will consider sulfur dioxide and particulate emission sources from the proposed alunite project, and a determination would be made as to whether the new source would cause a deterioration in ambient air quality beyond Class III limitations.

The Utah Division of Oil, Gas, and Mining. Issue Approved Notice of Intention for mining operations including mining reclamation plan for the alunite mine. (The State Mined Land Reclamation Act of 1975 [The Utah Code Annotated 1953, as amended 40-8] provides that any new mining operation must have an approved reclamation plan.)

ACTIONS PROPOSED BY APPLICANT

Purpose and need. Alunite is a basic hydrous potassium aluminum sulfate ($KA\ell_3(OH)_6(SO_4)_2$) which, in its pure form, contains 37 percent alumina, 11.4 percent potash, 38.6 percent sulfur trioxide, and 13 percent water. In processing alunite there would be three products: alumina, potassium sulfate, and sulfuric acid. In addition, phosphate fertilizers would be produced using phosphate rock from Idaho and sulfuric acid from the alunite processing plant. Aluminum fluoride would be produced using products from the alunite process and the phosphate fertilizer plant.

Alumina. Alumina would be the principal product from the proposed alunite mining and processing operation. Currently, approximately 88 percent of all aluminum needs in the United States are supplied by imported bauxite and alumina (U.S. Bureau of Mines, 1975). To date, U.S. technology and economics have limited the commercial alumina raw material to bauxite.

Aluminum is second only to iron in U.S. metal consumption. The dependence on foreign alumina and bauxite supplies, coupled with the importance of aluminum to the United States, is a source of concern to both government and industry. The development of a domestically available alternative source of alumina is considered to be in the national interest (Letter, E.F. Osborn, Director, U.S. Bureau of Mines, July 2, 1971).

The applicant states that, based on current metallurgical studies, alunite appears to be a viable economic and technological alternative to bauxite as a source of alumina. Although an alunite mining and processing complex exists in the Soviet Union, the proposed action represents the first such complex for the United States. Based on recent field surveys by the applicant, vast quantities of alunite are thought to exist within this country.

At the projected rate of production, the proposed alunite project would provide approximately 5.7 percent of the Nation's 1974 alumina needs. This estimate is based on the requirement of 2 tons of bauxite for the production of 1 ton of alumina (U.S. Bureau of Mines, 1975). The alumina would be shipped by rail to existing smelters in the Northwest or to National Southwire Aluminum facilities in Kentucky.

Potassium sulfate. A secondary product of alumina production from alunite would be potassium sulfate. Approximately 95 percent of the potassium consumed in the United States is used for agricultural fertilizer.

The bulk of domestic potassium is produced as potassium chloride. However, potassium sulfate has several distinct advantages over potassium chloride. Potassium sulfate has a higher unit value of potassium than the chloride compound. Potassium sulfate is preferred as a fertilizer for some crops due to the adverse effects of the chloride ion on plant growth. Potassium chloride also produces a pollution problem; the chloride ion carried in solution in irrigation waters increases salinity, which limits downstream domestic and agricultural use of the water. On the other hand, the sulfate ion, when released from potassium, may chemically combine with some calcium compounds present in soils and water and precipitate as a relatively inert substance (gypsum), which would not contribute to the salinity problem. Potassium sulfate would be transported from the plant site by rail to existing domestic markets or to seaports for export to foreign markets.

Sulfuric acid. The third product from alunite processing would be derived from roasting the alunite ore and capturing the sulfur gases to produce sulfuric acid. The applicant states that roaster gases would be treated to remove in excess of 99 percent of their sulfur dioxide content prior to atmospheric discharge. Sulfuric acid would be utilized by the applicant to produce phosphate fertilizer.

The applicant controls phosphate rock reserves in southern Idaho. Refined phosphate rock would be transported from the Soda Springs, Idaho area to the proposed Beaver County processing plant complex, where the phosphate fertilizer would be produced.

Phosphate fertilizer. Phosphorus is one of the essential elements for plant growth and phosphate fertilizers are used extensively in agriculture in the United States and foreign countries. Much of the new capacity for producing phosphate fertilizer in this country is intended to produce products for export. How much is actually exported depends upon existing contracts with foreign buyers, spot price levels for phosphate in the world markets, and domestic prices.

Phosphate fertilizer would be shipped from the plant site by rail to existing domestic markets or to seaports for export to foreign markets.

Aluminum fluoride. Fluosilicic acid would be obtained as a byproduct of the phosphate fertilizer plant. It would be treated with alumina trihydrate, which is a product of the alunite process, to produce aluminum fluoride which is used in the aluminum smelting industry.

The aluminum fluoride would be transported with the alumina to existing smelters in the Northwest or to National Southwire Aluminum.

Location of all components. The proposed mine and processing plant complex would be located in western Beaver County, Utah, approximately 60 miles north-northwest of Cedar City, Utah, and 30 miles west-southwest of Milford, Utah. Figure 1-1 shows the location of the proposed project site in the State of Utah. Figure 1-2 shows the location of all major components of the proposed project on a larger scale map. It should be pointed out that the plant location shown on figure 1-2 is about 1.5 miles northeast of the plant site in the draft statement. This minor

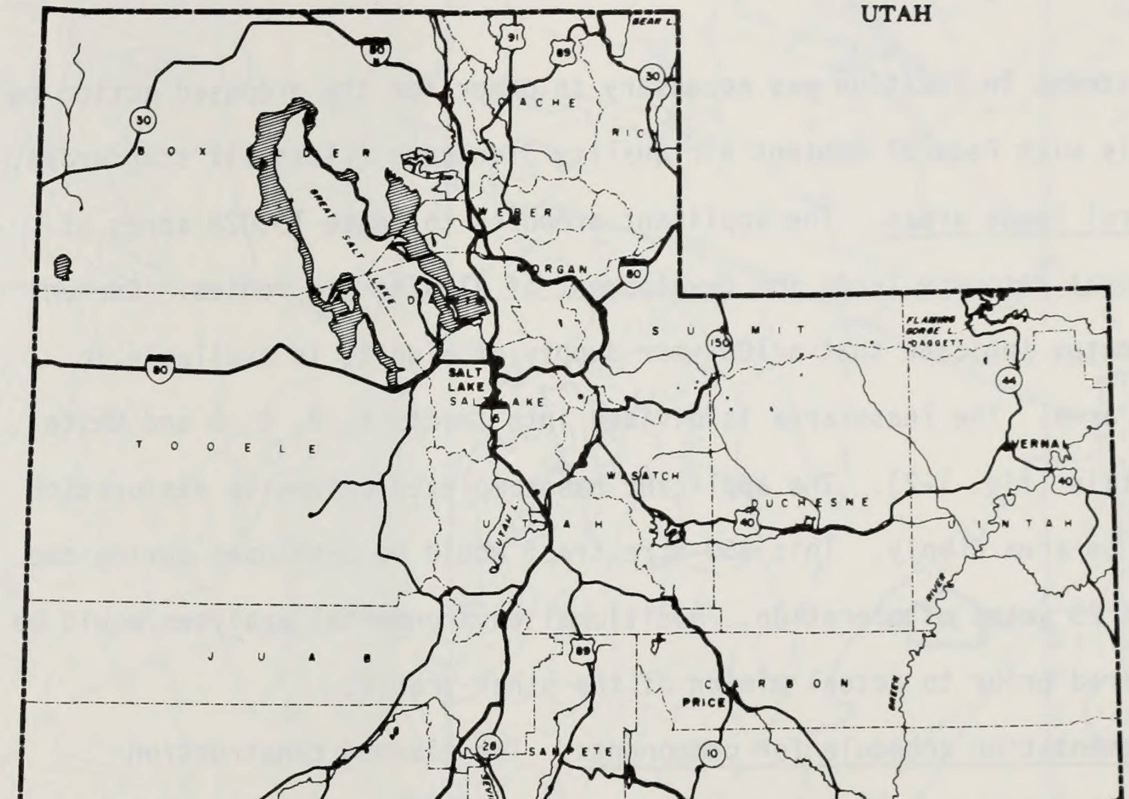


FIGURE 1-1

STATE MAP SHOWING PROJECT LOCATION

adjustment in location was necessary in order for the proposed action to comply with Federal Ambient Air Quality Standards (Class III standards).

Mineral lease areas. The applicant proposes to lease 13,828 acres of national resource lands for development of alunite ore bodies. Current estimates indicate that a 100-year supply of alunite is available in this area. The lease area is divided into tracts A, B, C, D and White Mountain (fig. 1-2). The applicant has completed intensive exploration work on area C only. This 350-acre tract would be developed during the first 25 years of operation. Additional environmental analyses would be required prior to actual mining of the other tracts.

Implementation schedule for components. The planned construction period would be 42 months from the date that all necessary permits, rights-of-way, leases, and land exchanges have been approved. Construction of certain support components (access roads, water wells, temporary construction camp, tailings ponds, railroad spur, etc.) would begin during month 1, but construction of the processing plant complex would not begin until month 13. Certain support components may become operational, either at full or partial capacity, early in the proposed schedule in order to be available for use during the construction phase. Checkout and startup of the plant components would begin in month 39. Figure 1-3 shows the general schedule of implementation for the proposed action.

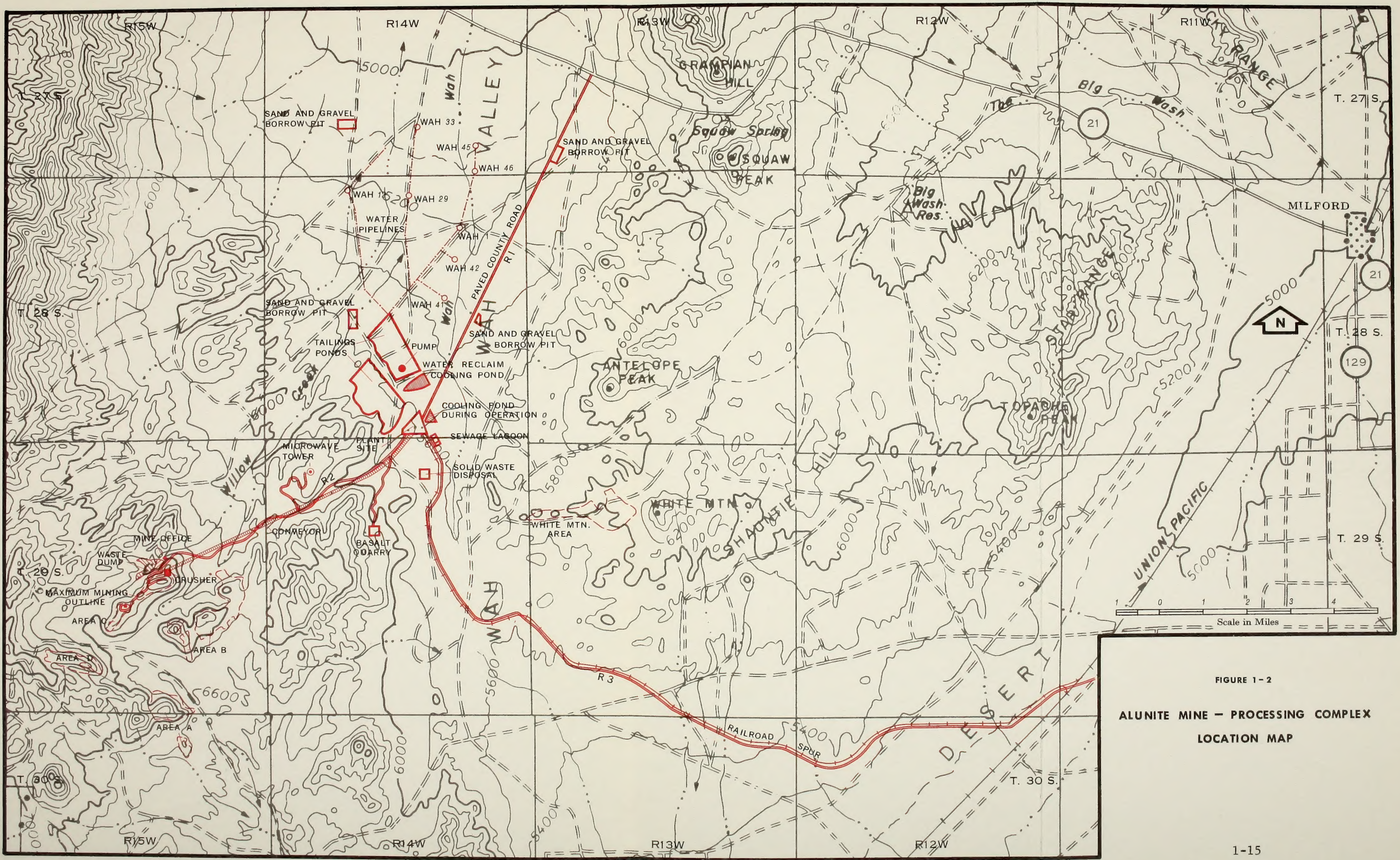
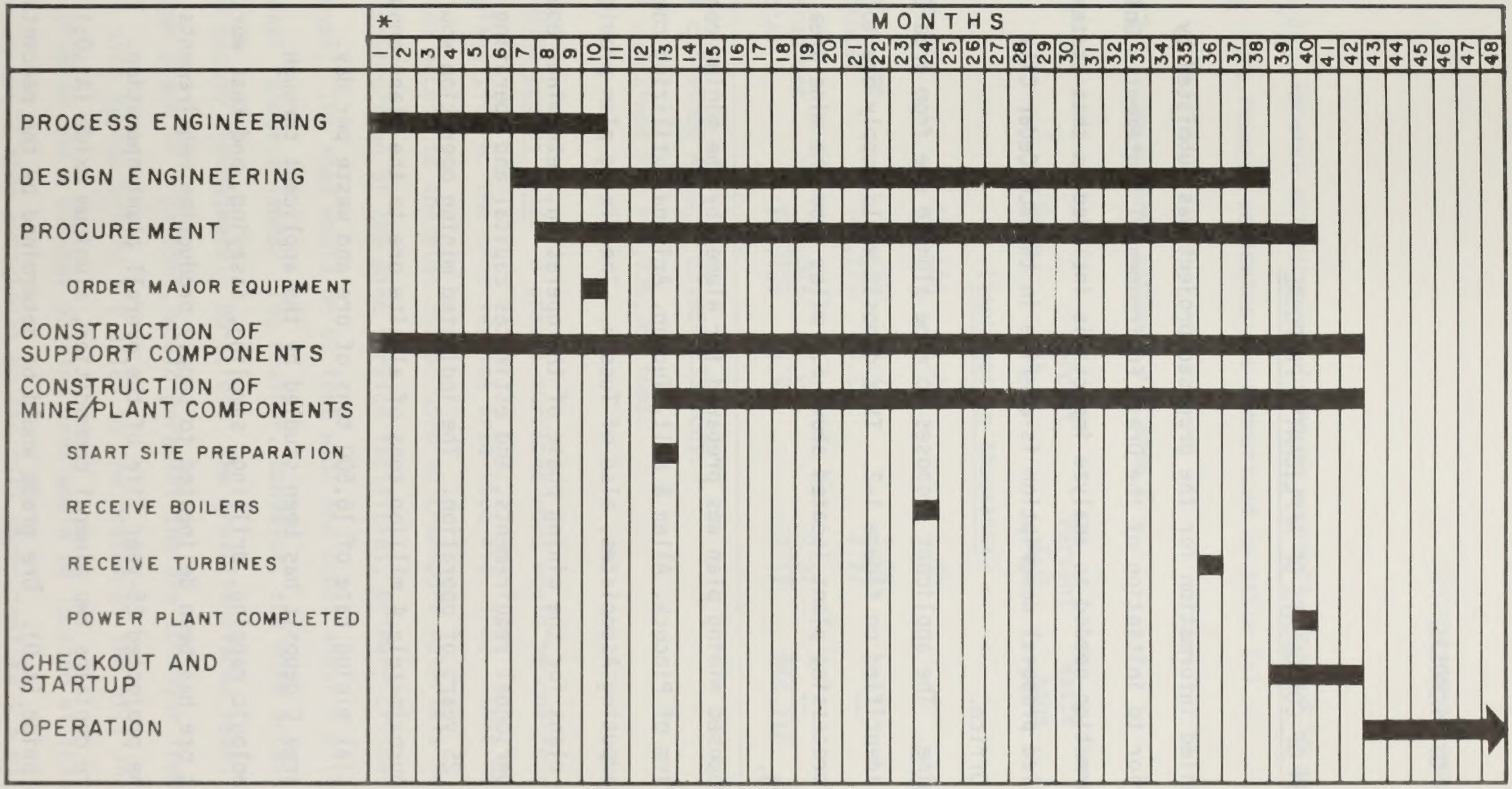


FIGURE 1-2

ALUNITE MINE – PROCESSING COMPLEX LOCATION MAP



*Month I is defined as that point when all necessary permits, rights-of-way, leases, and land exchanges have been approved.

Figure I-3
SCHEDULE OF IMPLEMENTATION
FOR THE ALUNITE PROJECT

DEFINITION OF COMPONENTS OF APPLICANT'S PROPOSAL

Detailed information for the proposed project was submitted by Alumet prior to initiation of the Draft Environmental Statement. Only that information needed to analyze impacts is included in this statement. The detailed proposal description is on file in the BLM Cedar City District Office.

Alunite mine. The applicant proposes to mine alunite ore from area C which is identified on figure 1-2. This deposit would supply ore to the proposed processing plant located about 6.6 miles from the mine area (fig. 1-2).

A proposed mining plan was prepared for Alumet by the mining consultant firm of Pincock, Allen & Holt, Tucson, Arizona, utilizing computer work by Computing Associates, also of Tucson. The mining plan provides operating plans for the mining phase of the operation, determines equipment and personnel requirements, and estimates capital and operating costs for 25 years of operation. The indicated mining operation would deliver approximately 4 million tons of alunite ore to the plant annually at an initial mining rate of 16,500 tons of ore and waste per day.

The area C deposit has been studied by the applicant through surface geologic mapping, drilling, sampling, assaying, and test work. Sufficient ore has been delineated to supply production requirements through the projected 25-year life of the overall plant operation. The alunite ore contains two mineral commodities, aluminum oxide ($A\ell_2O_3$) and potassium oxide (K_2O). Ore grade would be determined by the percentage of $A\ell_2O_3$. Reserve estimates are based on a cutoff grade of 10 percent $A\ell_2O_3$. Ore reserve estimates are summarized in table 1-1.

Table 1-1. Ore reserve estimate for area C

	Tons	Percent $A\ell_2O_3$	Percent K_2O	Waste tons	Total tons
	(tonnages in thousands)				
Proven ore	129,400	14.03	3.30	--	--
Probable ore	17,770	14.77	3.08	--	--
Subtotal	147,170	14.12	3.27	--	--
Inferred ore	18,015	17.09	2.31	--	--
Total	165,185	14.45	3.17	246,712	411,897

Total contained $A\ell_2O_3$ = 23,869,233 tons.

Total contained K_2O = 5,236,365 tons.

Mine access road. A gravel-surfaced road would be constructed from the plant site to the mine service area (see fig. 1-2). This road would provide access to the mine and be used to transport materials and equipment for construction of the mine service facilities, primary crusher, and conveyor. The road would be 60 feet wide and cross about 6 miles of national resource lands. The crusher, conveyor, and mine access road would occupy approximately 80 acres. The gravel-surfaced road, with a maximum grade of 7 percent, would parallel the ore conveyor from the plant site approximately 4.5 miles to the bottom of the hill in area C. A gate house and a visitor parking area would be located at this point. The road would then switchback up the hill approximately 1.5 miles, with a maximum grade of 8 percent, to the mine service area. An ammonium nitrate and fuel oil storage area would be provided adjacent to the main road below the mine service area (see fig. 1-4). A high explosives magazine, served by an unimproved dirt road 800 feet long (fig. 1-4), would be constructed near the base of the hill.

Mine development roads. These roads would be constructed from the ridge containing the ore deposit to the primary crusher and dump areas. The combined length of these roads would be 12,500 feet with an average width of 60 feet (fig. 1-4).

Mine service area. The mine service area would be constructed on a small hill adjacent to and northeast of the main area C ridge (fig. 1-4). This hill would be "flattened" to an elevation of 7,200 feet; broken rock would be pushed to the east and south edges to provide sufficient yard area. The resulting area would be about 8 acres.

The facilities proposed for the mine service area include mine office, service shops and warehouses, refueling station, truck parking, ore surge pile, crusher, conveyor station, and substation. Most of these facilities would be constructed on a solid rock foundation. Detailed design plans have not been prepared for these facilities.

Mining operations. The area C alunite mineral deposit is exposed along a prominent ridge outcrop (fig. 1-5). Site preparation prior to mining would include construction of mine access roads, clearing of vegetation and non-ore surface material, and establishment of mining benches. Only after the ridge had been mined down for several years, would there be any appreciable waste rock removal required to uncover

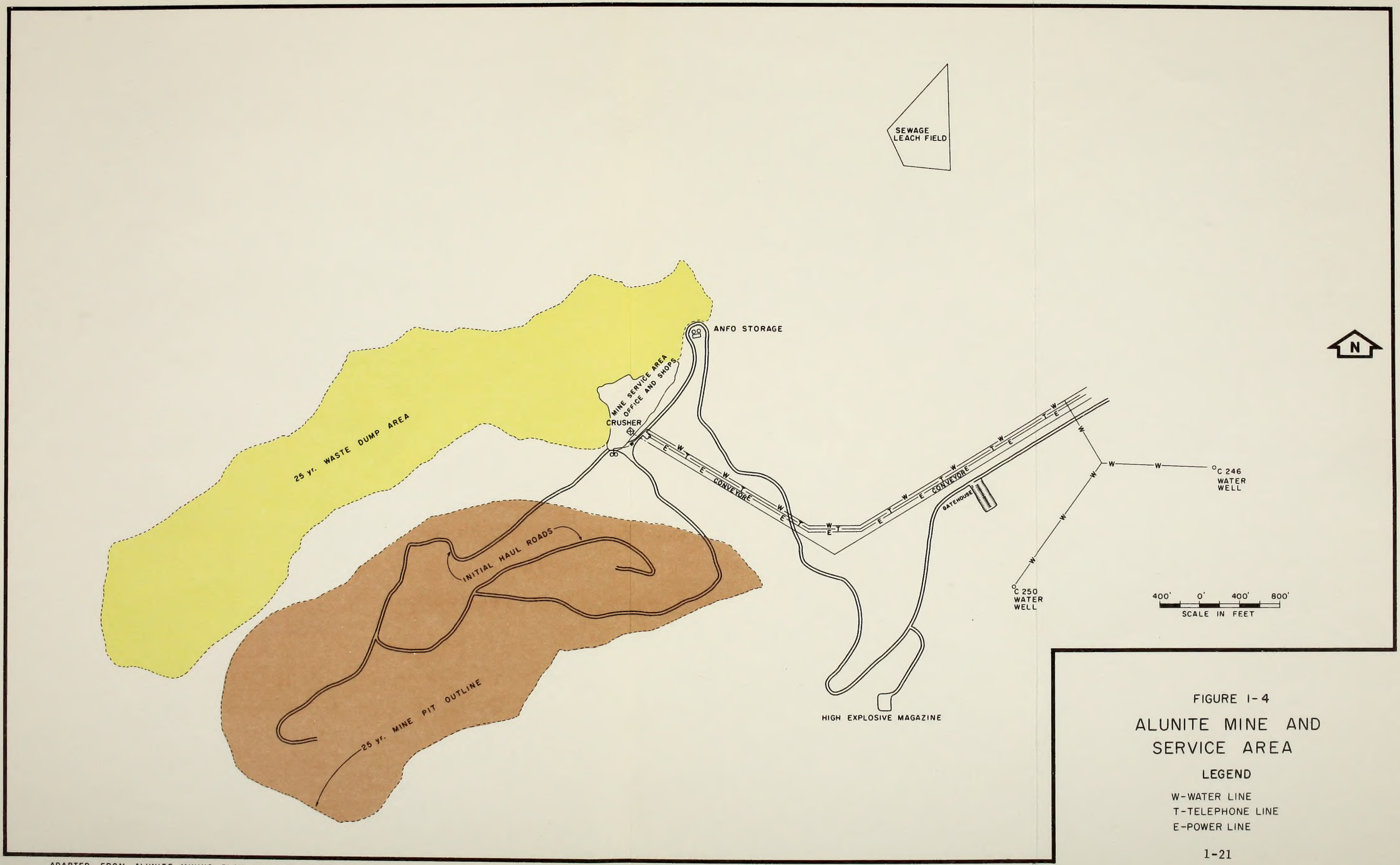


FIGURE I-4

ALUNITE MINE AND SERVICE AREA

LEGEND

W-WATER LINE
T-TELEPHONE LINE
E-POWER LINE

ADAPTED FROM ALUNITE MINING PLAN, PINCOCK, ALLEN & HOLT, INC.

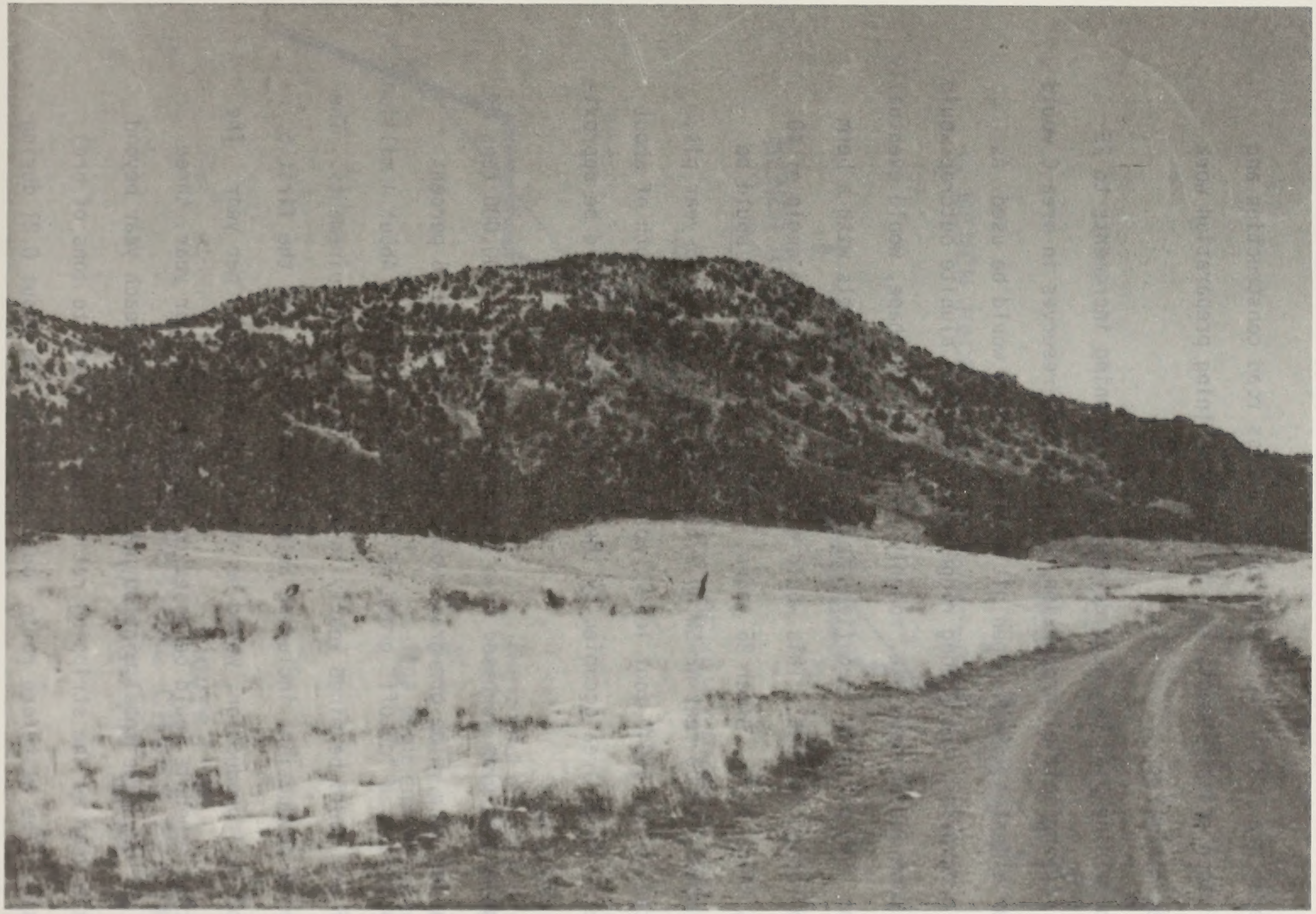
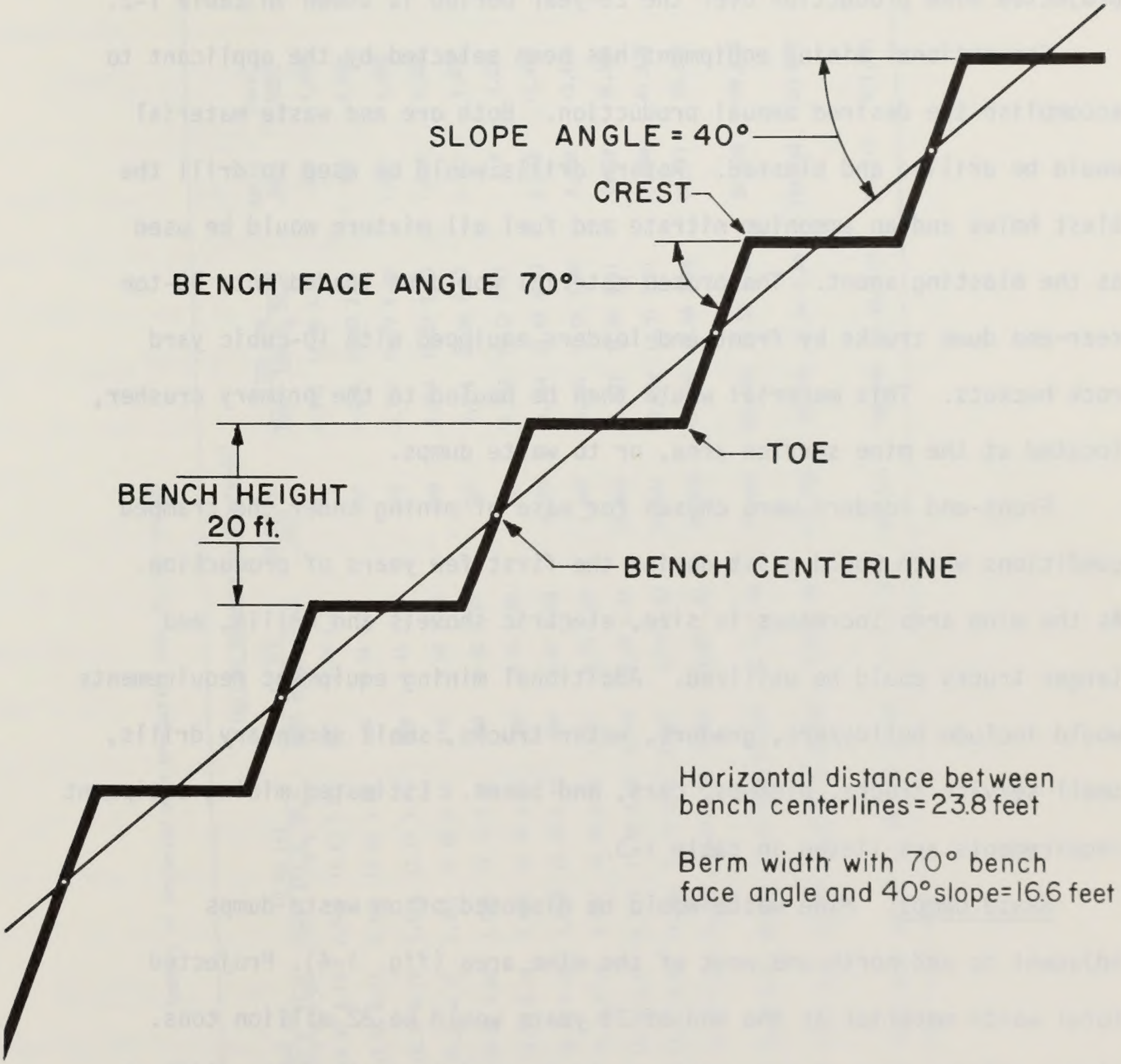


Figure I-5
AREA C-PROPOSED ALUNITE MINE

the deeper ore. With the exception of access road construction and mining bench establishment, the initial pre-mining preparation work would be minimal.

The mining plan has been developed in planning increments to 25 years. At the initial production rate, the ore reserves in area C would last for almost 43 years. Open pit mining methods would be used. As mining progresses, the oblong ridge containing the alunite outcrop would be cut down and an open pit, roughly elliptical in shape, would eventually develop. The pit plan specifies mining on 20-foot levels with a berm width of about 16 feet. This would give an overall slope angle of 40 degrees (fig. 1-6). After 25 years, the final pit outline would be approximately 5,000 feet NE-SW by 2,500 feet NW-SE. The 25-year pit, projected to the 6,940-foot level, would have a maximum depth of about 450 feet. Total area occupied by the mining operation would be approximately 240 acres.

The mining plan is based on a production output of 500,000 tons of alumina per year. The ore grade would range from about 16 percent alumina down to a "cutoff" grade of 10 percent alumina. About 4 million tons of ore would be mined yearly to meet production requirements. The total mine production, including both ore and waste, for the first 6 years of full production, would be about 5 million tons per year. The production schedule would be based on 305 work days per year, three shifts per day. The total mine output would increase each year beyond the sixth year as the stripping ratio (tons of waste to tons of ore) increases. The waste/ore ratio would increase from about 0.21 during



Horizontal distance between bench centerlines = 23.8 feet

Berm width with 70° bench face angle and 40° slope = 16.6 feet

Figure I-6
THEORETICAL CROSS SECTION THROUGH PIT WALL

the early years to about 1.52 by the end of the 25th year. A summary of projected mine production over the 25-year period is shown in table 1-2.

Conventional mining equipment has been selected by the applicant to accomplish the desired annual production. Both ore and waste material would be drilled and blasted. Rotary drills would be used to drill the blast holes and an ammonium nitrate and fuel oil mixture would be used as the blasting agent. The broken material would be loaded into 50-ton rear-end dump trucks by front-end loaders equipped with 10-cubic yard rock buckets. This material would then be hauled to the primary crusher, located at the mine service area, or to waste dumps.

Front-end loaders were chosen for ease of mining under the cramped conditions which would exist during the first few years of production. As the mine area increases in size, electric shovels and drills, and larger trucks could be utilized. Additional mining equipment requirements would include bulldozers, graders, water trucks, small secondary drills, small service trucks, pickups, cars, and buses. Estimated mining equipment requirements are listed in table 1-3.

Waste dumps. Mine waste would be disposed of on waste dumps adjacent to and north and west of the mine area (fig. 1-4). Projected total waste material at the end of 25 years would be 82 million tons. Eleven million tons of this waste would be used to restore the ridge at the east end of the mine area to approximate its original shape. This would be accomplished between years 20 and 25, after mining in that end of the pit had been completed. This pit backfill would cover an estimated 38 acres. The remaining 71 million tons of waste would cover approximately 177 acres after 25 years.

Table 1-2. Summary of projected mine production over 25-year period

(column tonnages in thousands)

Year	14% and up			10 to 14%			8 to 10%			Below 8%	+10% Ore			Waste tons	Total tons	Waste/ore ratio
	Tons	$\%A\ell_2O_3$	$\%K_2O$	Tons	$\%A\ell_2O_3$	$\%K_2O$	Tons	$\%A\ell_2O_3$	$\%K_2O$	Tons	Tons	$\%A\ell_2O_3$	$\%K_2O$			
1	1,969	14.97	4.19	2,041	12.83	3.50	291	8.96	2.25	566	4,010	13.88	3.84	857	4,867	.21
2	1,677	15.55	4.17	2,399	12.58	3.60	199	9.24	2.12	757	4,076	13.80	3.84	956	5,032	.23
3	2,137	16.73	4.75	1,654	12.27	3.46	269	9.45	2.74	972	3,791	14.78	4.19	1,241	5,032	.33
4	1,753	15.88	4.31	2,251	12.65	3.44	210	9.28	2.35	818	4,004	14.07	3.83	1,028	5,032	.26
5	1,906	16.62	4.60	2,005	12.18	3.38	399	9.22	2.01	722	3,911	14.34	3.97	1,121	5,032	.29
6	1,600	14.95	4.14	2,622	12.34	3.28	286	9.15	2.90	524	4,222	13.33	3.61	810	5,032	.19
7-8	3,186	15.75	4.29	5,058	12.07	2.73	899	9.07	1.93	4,277	8,244	13.49	3.33	5,176	13,420	.63
9-10	2,685	15.39	4.13	6,007	12.01	2.92	1,081	9.12	2.03	3,647	8,692	13.05	3.30	4,728	13,420	.54
11-15	5,166	15.93	4.17	16,511	11.90	2.65	3,174	9.22	2.03	12,054	21,677	12.86	3.01	15,228	36,905	.70
16-20	6,102	16.97	4.53	14,788	11.79	2.67	2,521	9.23	1.83	18,527	20,890	13.31	3.21	21,048	41,938	1.01
21-25	8,663	16.24	4.22	11,285	12.24	2.88	1,759	9.03	1.61	28,618	19,948	13.98	3.46	30,377	50,325	1.52
Total	36,844	16.09	4.31	66,621	12.07	2.88	11,088	9.17	1.96	71,482	103,465	13.50	3.39	82,570	186,035	.80
26-43±	34,226	19.17	3.37	27,594	12.17	2.09	8,050	9.07	1.46	156,092	61,720	16.04	2.80	164,142	225,862	2.66
Total Reserve	70,970	17.57	3.86	94,215	12.10	2.65	19,138	9.13	1.75	227,574	155,185	14.45	3.17	246,712	411,897	1.49

Table 1-3. Estimated equipment requirements for operation of the Alunite mine

Quantity	Description (Brand names used only to indicate type)
2	Wheel loader, Cat 992B, 10 cu. yd. rock bucket
1	Wheel loader, Cat 998, 6 cu. yd. rock bucket
2	Rotary drill, Robbins RRT-60, truck-mounted
7	Haul truck, Cat 883, 50 ton
2	Tractor, Cat D8K, straight bulldozer, multishank ripper with one tooth
2	Motor grader - Cat 14G
2	Water truck, 5,000 gal.
2	Service trucks
1	Welding truck
1	Tire truck
1	Man bus
1	Ambulance (station wagon with accessories)
1	Air Trac drill, GD ATD 3100 with PR-123 drill
1	Compressor, GD SP-750
4	Pickup, 3/4 ton
4	Pickup, 1/2 ton
1	Off-road vehicle (Jeep type)
1	Station wagon
	Engineering equipment, transits, levels, drafting equipment, etc.

The applicant proposes to construct the dumps with irregular, contoured outlines in an effort to blend them into the surrounding topography.

Ore conveyor. Alunite ore from the mine would be transported by truck to the primary crusher located at the mine service area. The crusher would reduce the ore to less than 8 inches in diameter. The applicant proposes to construct a cable belt conveyor to transport the crushed ore to the plant site for processing, an overall distance of approximately 6.6 miles. Detailed engineering has not been completed for the conveyor line, however, the general location is shown on figure 1-2.

The proposed conveyor would be a 36-inch cable belt installation using 2-inch diameter driving cables capable of operating at 200 feet per minute. The nature of the terrain to be crossed, with a fall of over 1,200 feet, would require that the conveyor be electrically braked. The entire length of the conveyor, including an adjacent walkway, would be covered. The cover would be rectangular in shape, designed to withstand snow loads up to 30 pounds per square foot. Technical characteristics of the conveyor are shown in table 1-4.

Water uses. Inherent in any open pit mining operation is the creation of fine rock dust from drilling, blasting, loading, hauling, and crushing activities. The main use of water in the mining operation would be for dust suppression. Water trucks would be used to sprinkle roads and working mine benches. Additional water would be needed for sanitation, potable water supply, and fire control.

The applicant estimates that total water requirements to support the mining operation would be no more than 32 acre-feet yearly. The water supply would be obtained from two wells located near the mine area. Additional information on the mine water system can be found in the description of the water system contained in this chapter.

Table 1-4. Technical characteristics - cable belt ore conveyor

Conveyor length	25,000 feet
Difference in level between terminals	1,240 feet fall
Rated capacity[a]	1,000 short tons per hour
Conveyor loading at rated capacity[a]	46 pounds per square foot
Material	Alunite rock
Material density	105 pound per cubic feet
Material lump size	8 inches maximum
Daily operating time	14 hours
Annual operating time	4,300 hours
Annual tonnage	4,000,000
Belt width	36 inches
Conveyor speed	200 feet per minute
Safety factor of cable at rated capacity	3.75:1

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[a] Stand rate capacity is average over the conveyor length, assuming that feed rates are controlled to ± 10 percent.

Processing plant complex

Introduction. Processing of alunite ores on a scale of 3 million tons per year in the Soviet Union (Metals Source Book, 1973), and on a smaller scale of 33,000 tons per year in Mexico (Parkinson, 1971), has been reported. A pilot plant to make 100 tons of alumina per day was operated in Salt Lake City, Utah in 1944-45 (Fleisher, 1944). The alunite ore for this operation was mined near Marysvale in southern Utah. Several hundred articles describing research and development for processing alunite ores appear in the world's technical literature.

The process selected by Alumet for the Wah Wah range alunite would be similar to the Russian process. A reductive roast would be used to disrupt the alunite mineral lattice in preparation for separating its components. Aluminum sulfate would decompose with liberation of sulfur dioxide (SO_2). Potassium sulfate in the mineral would become essentially water soluble. The liberated SO_2 would be converted to sulfuric acid which Alumet would use in the manufacture of phosphate fertilizer. Potassium sulfate would be dissolved from the reduced calcine (produced by roasting alunite ore) by a weak potassium hydroxide (alkaline) leach solution, recovered by evaporation and crystallization, and marketed. The alkaline leach residue would be digested in a strong caustic solution to dissolve the alumina; undissolved silica would be discarded. The dissolved alumina would be recovered from the leach solution by crystallization and calcined for marketing. Alumet also proposes the manufacture of byproduct aluminum fluoride by reacting a portion of an intermediate alumina product (aluminum trihydrate) with fluorides scrubbed from the phosphate fertilizer plant offgas.

Processing plant production. Alumet estimates production for market from the processing plant complex as summarized below. These production estimates are the basis for the analysis in this statement of atmospheric emissions and waste products.

1. Alumina - 500,000 tons per year
2. Potassium sulfate - up to 370,000 tons per year
3. Phosphate fertilizers
    Granular triple superphosphate - up to 1.1 million tons per year
    Ammonium phosphates - up to 605,000 tons per year
4. Aluminum fluoride - up to 20,000 tons per year

Raw material requirements and probable source of supply. In addition to alunite ore and water, principal annual raw material requirements would include:

1. Coal for electrical energy, process heat generation, and roasting of alunite - up to 1.15 million tons (from applicant-owned mines or open-market sources)
2. Calcined phosphate rock for processing into phosphate fertilizer - 1.525 million tons (from applicant-controlled mines in Idaho)
3. Fuel oil for firing the kilns to dry and dehydrate alumina and aluminum fluoride - 25 million gallons (from open-market sources)
4. Potassium hydroxide for decomposing unreacted aluminum sulfate during aqueous leaching of potassium sulfate from the reduced calcine - up to 100,000 tons (from open-market sources)
5. Makeup sodium hydroxide for dissolving alumina - up to 50,000 tons (from open-market sources)

6. Sulfur for manufacture of additional sulfuric acid - 150,000 tons (from open-market sources)

7. Ammonia for manufacture of ammonium phosphate fertilizers - up to 160,000 tons (from open-market sources)

8. Lime for purifying the alumina leach solution and for scrubbing SO_2 from waste gases - 120,000 tons (from open-market sources)

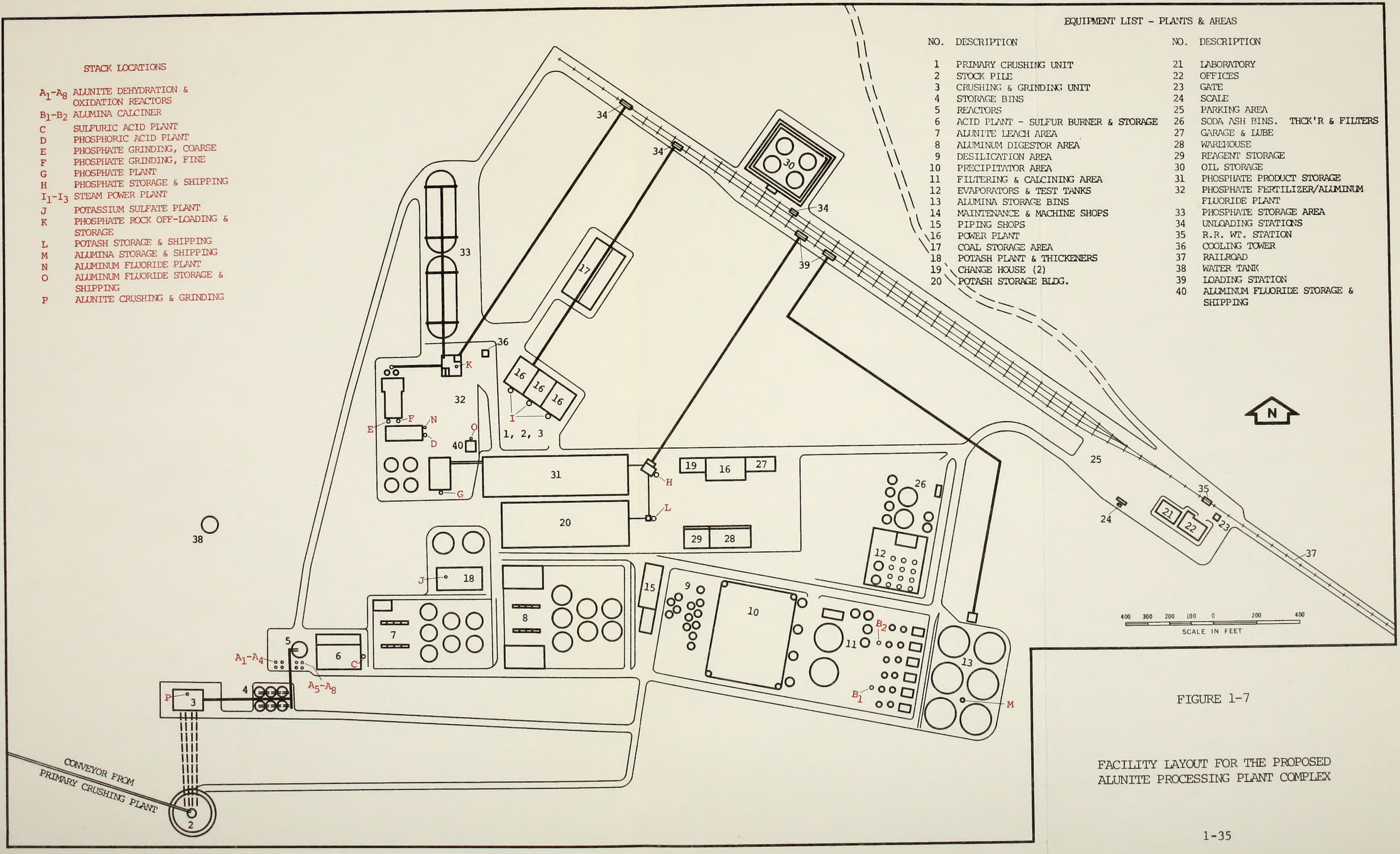
Alumet estimates the time for design, construction, and startup of the processing plant complex would be 42 months (fig. 1-3). A 20-megawatt diesel electric generating unit would furnish power required during construction. One of the first buildings constructed would be a warehouse which would provide storage and office space during construction. Figure 1-7 shows a possible plant layout. Engineering design changes would have to be made in order for the proposed action to meet Federal Ambient Air Quality Standards and this layout is provided to give a general idea of the processing plant design. Alumet has not provided detailed information on the actual construction process for the segments of the various processing plants. All segments of the plant complex would be interdependent and operate in an integrated manner.

The following discussion of each major segment of the processing plant is a summary of information provided by the applicant. The detailed information submitted by the applicant is on file at the Cedar City District Office of the Bureau of Land Management. The process described in this chapter for production of potassium sulfate and alumina has not been attempted on a commercial scale in the United States. Emissions and chemical properties of waste material could be somewhat different from those estimated by Alumet. However, data from the Alumet pilot plant and the commercial plant in the Soviet Union indicate that these emissions would be similar. The primary sources of data for this section are the alunite processing pilot plant operated by the applicant in Golden, Colorado and available information on the operation of alumina plants, sulfuric acid plants, phosphate fertilizer plants, and coal-fired power generating plants.

Alunite plant. Alumet proposes to process alunite ore for the recovery of alumina, sulfur dioxide, and potassium sulfate. The ore to be processed contains 40 percent alunite (14.8 percent alumina and 4.1 percent potassium oxide), with silica as the main gangue or stony mineral.

Alumet proposes to process 12,000 tons of ore per day for SO_2 recovery (1,000 tons per day), potassium sulfate recovery (1,100 tons per day), and alumina recovery (1,500 tons per day). A portion of the potassium sulfate product would be derived from purchased potassium hydroxide used in the process. Equipment types and process details have not been finalized but the flowsheets in figure 1-8 and 1-9 generally depict contemplated operating practices. Individual operations, numbered to correspond with the flowsheet steps, are summarized below. Figure 1-8 covers steps 1 through 8 and figure 1-9 covers steps 9 through 13.

Step 1 - Crush, convey, and store. Alunite ore from the mine would be delivered by truck to the primary crusher for initial crushing to about 8 inches in size. The ore would then be transported 6.6 miles by a cable belt conveyor to the plant site where it would enter a storage pile with a live capacity of 42,000 tons. Crushing of 14,000 tons of



STACK LOCATIONS

A_1-A_8	ALUNITE DEHYDRATION & OXIDATION REACTORS
B_1-B_2	ALUMINA CALCINER
C	SULFURIC ACID PLANT
D	PHOSPHORIC ACID PLANT
E	PHOSPHATE GRINDING, COARSE
F	PHOSPHATE GRINDING, FINE
G	PHOSPHATE PLANT
H	PHOSPHATE STORAGE & SHIPPING
I_1-I_3	STEAM POWER PLANT
J	POTASSIUM SULFATE PLANT
K	PHOSPHATE ROCK OFF-LOADING & STORAGE
L	POTASH STORAGE & SHIPPING
M	ALUMINA STORAGE & SHIPPING
N	ALUMINUM FLUORIDE PLANT
O	ALUMINUM FLUORIDE STORAGE & SHIPPING
P	ALUNITE CRUSHING & GRINDING

EQUIPMENT LIST - PLANTS & AREAS

NO.	DESCRIPTION	NO.	DESCRIPTION
1	PRIMARY CRUSHING UNIT	21	LABORATORY
2	STOCK PILE	22	OFFICES
3	CRUSHING & GRINDING UNIT	23	GATE
4	STORAGE BINS	24	SCALE
5	REACTORS	25	PARKING AREA
6	ACID PLANT - SULFUR BURNER & STORAGE	26	SODA ASH BINS. THCK'R & FILTERS
7	ALUNITE LEACH AREA	27	GARAGE & LUBE
8	ALUMINUM DIGESTOR AREA	28	WAREHOUSE
9	DESILICATION AREA	29	REAGENT STORAGE
10	PRECIPITATOR AREA	30	OIL STORAGE
11	FILTERING & CALCINING AREA	31	PHOSPHATE PRODUCT STORAGE
12	EVAPORATORS & TEST TANKS	32	PHOSPHATE FERTILIZER/ALUMINUM FLUORIDE PLANT
13	ALUMINA STORAGE BINS	33	PHOSPHATE STORAGE AREA
14	MAINTENANCE & MACHINE SHOPS	34	UNLOADING STATIONS
15	PIPING SHOPS	35	R.R. WT. STATION
16	POWER PLANT	36	COOLING TOWER
17	COAL STORAGE AREA	37	RAILROAD
18	POTASH PLANT & THICKENERS	38	WATER TANK
19	CHANGE HOUSE (2)	39	LOADING STATION
20	POTASH STORAGE BLDG.	40	ALUMINUM FLUORIDE STORAGE & SHIPPING

FIGURE 1-7

FACILITY LAYOUT FOR THE PROPOSED ALUNITE PROCESSING PLANT COMPLEX

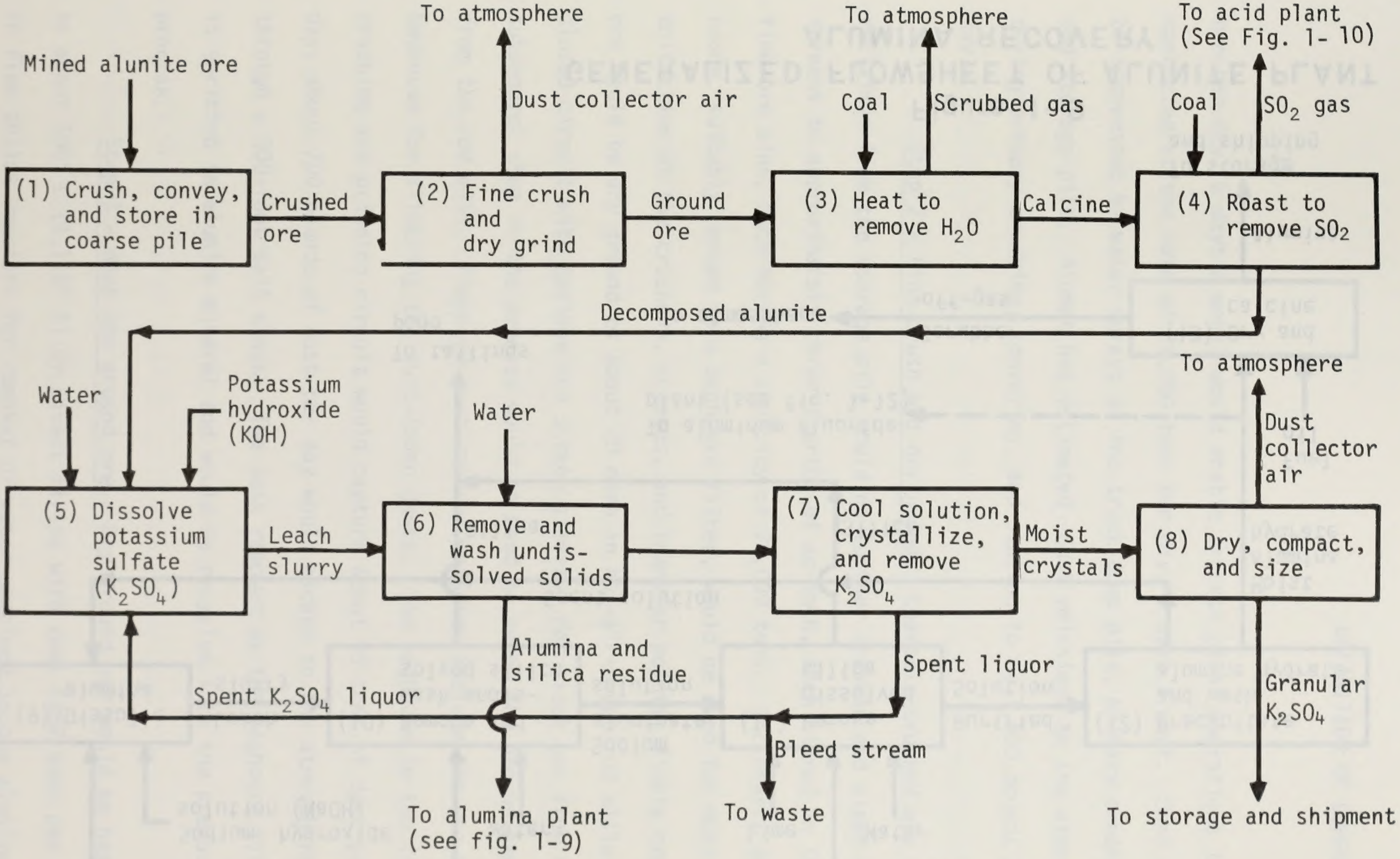

Mined alunite ore
(1) Crush, convey, and store in coarse pile
Crushed ore
To atmosphere
Dust collector air
(2) Fine crush and dry grind
Ground ore
To atmosphere
Coal
Scrubbed gas
(3) Heat to remove H_2O
Calcine
To acid plant (See Fig. 1- 10)
Coal
SO_2 gas
(4) Roast to remove SO_2
Decomposed alunite
Water
Potassium hydroxide (KOH)
(5) Dissolve potassium sulfate (K_2SO_4)
Leach slurry
Water
(6) Remove and wash undis-solved solids
Alumina and silica residue
To alumina plant (see fig. 1-9)
Spent K_2SO_4 liquor
(7) Cool solution, crystallize, and remove K_2SO_4
Spent liquor
Bleed stream
To waste
Moist crystals
To atmosphere
Dust collector air
(8) Dry, compact, and size
Granular K_2SO_4
To storage and shipment

Figure I-8
GENERALIZED FLOWSHEET OF ALUNITE PLANT:
SO_2 RELEASE AND POTASH RECOVERY

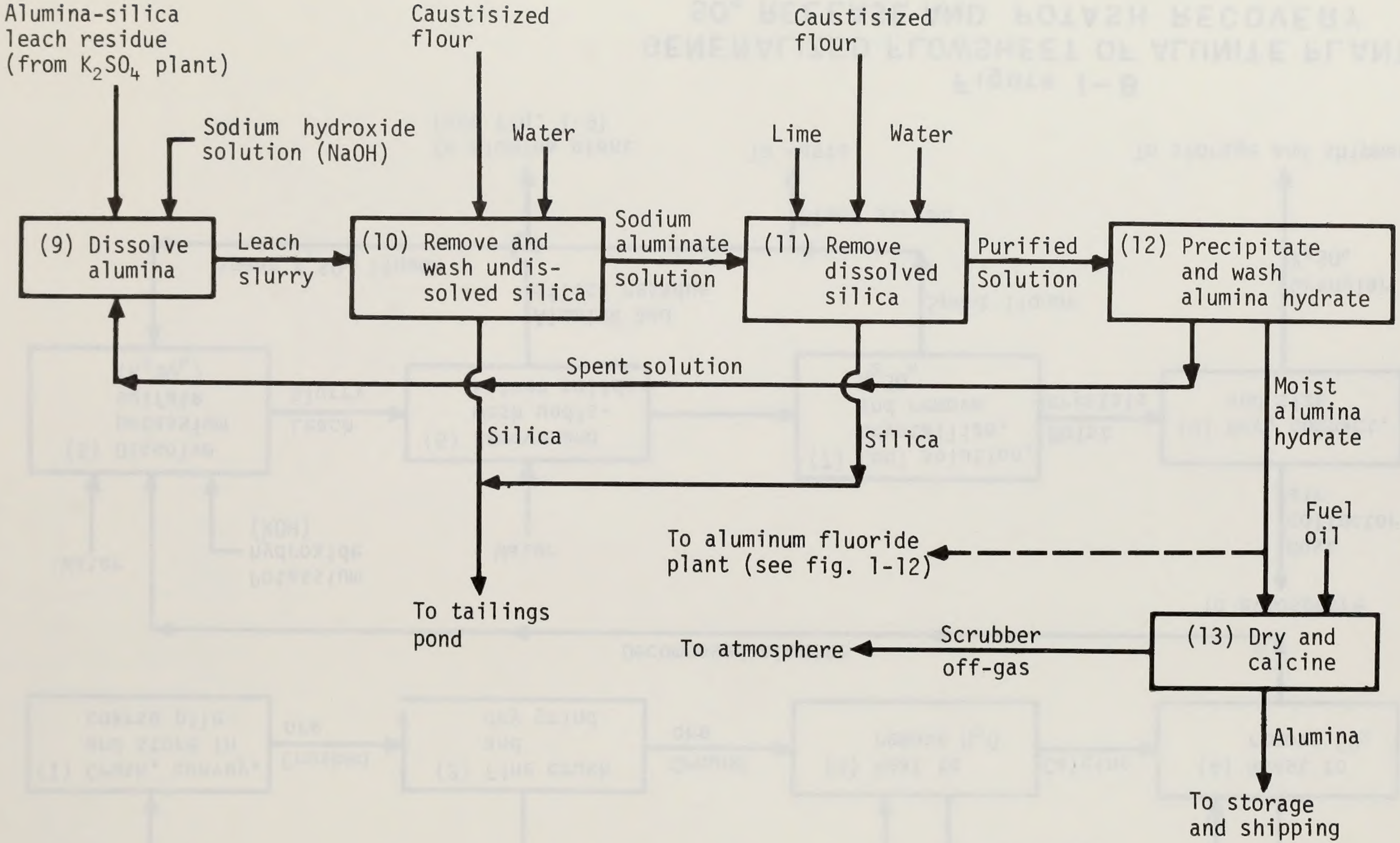

Alumina-silica leach residue (from K_2SO_4 plant)
Sodium hydroxide solution (NaOH)
(9) Dissolve alumina
Leach slurry
Caustisized flour
Water
(10) Remove and wash undis-solved silica
Sodium aluminate solution
Caustisized flour
Lime
Water
(11) Remove dissolved silica
Purified Solution
(12) Precipitate and wash alumina hydrate
Spent solution
Silica
Silica
To tailings pond
Moist alumina hydrate
To aluminum fluoride plant (see fig. 1-12)
Fuel oil
(13) Dry and calcine
Scrubber off-gas
To atmosphere
Alumina
To storage and shipping

Figure I-9
GENERALIZED FLOWSHEET OF ALUNITE PLANT ALUMINA RECOVERY

ore per day, 6 days a week, would enable process plant operations to be conducted at the rate of 12,000 tons per day, 7 days a week. Dust would be suppressed by water sprays at the truck dump pile, primary crusher, and storage pile. Alumet has estimated dust emissions to the atmosphere during primary crushing, conveying, and storing to be 1,400 pounds per day.

Step 2 - Fine crush and dry grind. Coarsely crushed ore reclaimed from the storage pile would be further crushed and sized on screens to approximately three-fourths of an inch, then stored in three fine ore bins, each having a capacity of 20,000 tons. Enclosures and hoods, suitably vented to a baghouse filter, would be used for dust collection at the crushers, screens, and transfer points. Finely crushed ore would be dry ground to about 20 mesh in hot-air-swept rod mills in closed circuit with cyclone and screen sizers. Hot stack gas from a subsequent step in the process would be used to sweep the ground ore from the rod mill. Proposed dust control measures include the use of a baghouse for filtering the dust-laden gases. The baghouse in the fine crushing and grinding circuit would capture about 90 tons of dust per day; about 700 pounds of dust per day would escape to the atmosphere through a 300-foot tall stack. The dust removed by the baghouse filter is enriched in alunite mineral and would be recycled into the production process.

Step 3 - Heat the ground ore. Dry ground ore would be heated to about 600° C (1,112° F) by direct firing with coal (982 tons per day) in fluo solids reactors for removal of water combined in the alunite molecule. The alunite mineral lattice would be disrupted with release of a small part of its sulfur as sulfur dioxide. Coarse dust and ash would be removed from the reactor offgas in cyclone separators. Reactor gas cleanup would be by wet lime scrubbing which is expected to remove 99 percent of the remaining dust and fly ash, 96 percent or more of the SO_2 and 20 percent of the nitrogen oxides (NO_x). Bleed slurry from the scrubbers which would be discarded daily to the silica tailings pond would contain: 122 tons of fly ash; 70 tons of alunite ore dust; and about 600 tons of unreacted lime, calcium sulfite, and calcium sulfate. Dissolved nitrates in the bleed slurry would be equivalent to 2 tons of NO_x daily. Emissions to the atmosphere, through eight 460-foot tall stacks, are estimated to total daily about 3,800 pounds of particulates, 22,800 pounds of SO_2 and 17,000 pounds of NO_x.

Step 4 - Roast the dehydrated ore. Hot, dehydrated ore would be roasted using proprietary technology for decomposition of the aluminum sulfate component of alunite to aluminum oxide ($A\ell_2O_3$) and SO_2. Controlled over-reduction followed by controlled reoxidation and cooling would be necessary to obtain a calcine that would be suitable for potash and alumina leaching, as well as an offgas rich in SO_2 and low in sulfur trioxide (SO_3) for producing acid. The reoxidation operation would use about 35 tons of coal per day and emissions from that operation are included with the totals in step 3.

Step 5 - Dissolve potassium sulfate. The roasted and cooled calcine would be leached in a hot, dilute solution of potassium hydroxide (KOH) to dissolve the potassium sulfate component of the alunite, and decompose any residual aluminum sulfate that may have escaped decomposition by roasting. Potassium sulfate itself is soluble in water. The potassium hydroxide would react with aluminum sulfate to form solid alumina and a solution of potassium sulfate. The scheduled use of up to 300 tons of KOH per day would be sufficient to react with enough aluminum sulfate to produce up to 465 tons of potassium sulfate daily.

Step 6 - Remove and wash undissolved solids. The potassium sulfate leach slurry would be thickened, filtered, and washed to obtain a solid residue plus a solution rich in potassium sulfate. Assuming the alunite ore feed to the plant would consist of 60 percent silica and iron oxide and 40 percent alunite, the solid residue to be processed in the alumina plant might consist of approximately 81 percent silica and iron oxide and 19 percent alumina.

Step 7 - Cool the leach solution, crystallize, and remove potassium sulfate. The hot leach solution, rich in potassium sulfate (K_2SO_4), would be cooled and concentrated in vacuum crystallizers. Exhaust steam would be condensed and the condensate used in the plant. A slurry of potassium sulfate crystals in depleted leach liquor would form in the crystallizers. Cold slurry from the crystallizers would be thickened and centrifuged to separate the K_2SO_4 crystals from the spent liquor. Most of the spent liquor would be recycled for hot leaching of potassium sulfate from the roasted calcine, but a portion would be discarded to the silica tailings pond to prevent an excessive accumulation of sodium sulfate impurities in the leach solution. It is estimated that the bleed solution, approximately 130 gallons per minute, would contain about 12 percent potassium sulfate and 5 percent sodium sulfate. The solution which would be discarded daily is estimated to weigh 850 tons and contain 100 tons potassium sulfate and 45 tons sodium sulfate.

Step 8 - Dry, compact, and size the potassium sulfate. Moist potassium sulfate crystals from the centrifuge would be dried in countercurrent rotary driers with preheated air. Dry potassium sulfate would then be blended with recycled fines and a small amount of water, compacted into sheets, and the sheets fragmented before sizing on screens.

Screen products would consist of oversized material that would be crushed and resized, fines that would be recycled to the compactors, and granular potassium sulfate of marketable size. The granular potassium sulfate of approximately 96 percent purity (52 percent potassium oxide equivalent), would be redried in rotary driers using a countercurrent flow of steam-heated air, then stored and shipped. Production would be scheduled to be 1,120 tons of potassium sulfate daily.

Drying, compacting, fragmenting, and sizing would be dusty operations which would require rigorous dust control measures. A baghouse filter is contemplated by the applicant. Particulate emissions to the atmosphere through a 210-foot tall stack are estimated at 100 pounds per day. Potassium sulfate storage and shipping would also be dusty operations. A baghouse filter would be used for dust control. Particulate emissions to the atmosphere through a 230-foot tall stack are estimated to be 250 pounds per day.

Step 9 - Dissolve alumina. Leach residue from step 6 consisting mainly of alumina, silica, and iron oxide from the potassium sulfate plant, would be digested in a hot (200° F) sodium hydroxide solution to dissolve the alumina. About 10 percent of the alumina would not dissolve. In addition, part of the silica would dissolve, requiring removal from solution in a subsequent desilication operation.

Step 10 - Remove and wash undissolved silica. Undissolved silica and alumina in the leach slurry would be settled and washed in thickeners, then reslurried in recycled tailings pond water and pumped to the silica tailings pond. Caustisized wheat flour would be used as a reagent to assist in settling and washing the silica residue. At 330 operating days per year, a 40 percent solids tailings slurry would contain 7,850 tons of residue and 11,700 tons of solution per day. The solids would consist of 7,200 tons of silica, 200 tons of alumina, and 450 tons of iron oxide and other compounds. The solution would contain 25 tons of dissolved alumina, 36 tons of caustic soda, and 32 tons of sodium carbonate.

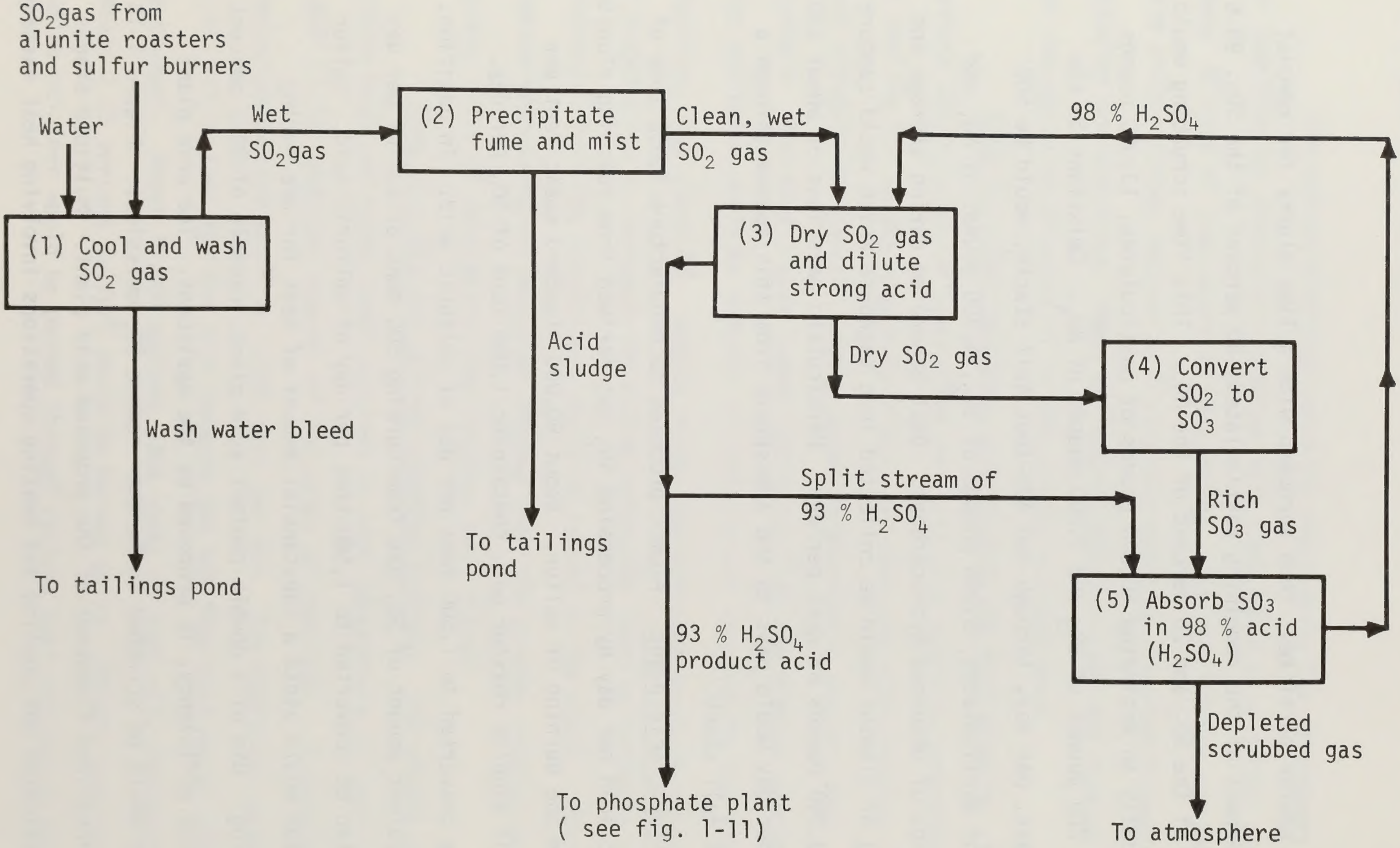
Step 11 - Desilicate the leach solution and remove precipitated silica. Dissolved silica would be precipitated from the leach solution by heating the liquor and mixing with fine seed particles of silica. The resultant slurry would be pumped to cyclone classifiers which would yield coarse silica particles for discard to the silica tailings, and a slurry of fine silica particles. The slurry, consisting of sodium aluminate solution and fine silica particles, would be settled in thickeners to remove the fine silica as a thickened mud that would be recycled to the desilication vessels as fine silica seed. Caustisized starch would be added to facilitate settling of the fine silica.

The sodium aluminate solution overflowing the thickeners would be clarified by pressure filtration with lime added as a filter aid. About 35 tons of lime would be used daily. The lime filter aid admixed with silica slimes removed by filtration would be slurried in waste solution and discarded. About 50 tons of hydrated lime and fine silica per day would be disposed of in the silica tailings pond.

Step 12 - Cool solution, precipitate and wash alumina. Alumina hydrate ($A\ell_2O_3 \cdot 3H_2O$) of controlled particle size would be precipitated by cooling the sodium aluminate liquor and admixing with aluminum hydrate seed crystals in several stages, using progressively smaller seed crystals. Depleted liquor (spent solution) from the alumina precipitation operation would be removed in settlers and recycled to the alumina digesting step (step 9). Before reuse, the solution would be concentrated by evaporation to increase the sodium hydroxide level to suitable strength. Condensate from the evaporators would be reused in the plant. Coarse alumina hydrate slurry would be removed from the primary settler and washed, first in thickeners, and finally, on a filter.

Step 13 - Dry and calcine aluminum hydrate. The washed aluminum hydrate would be dried, then calcined at high temperature (2,200° F to 2,300° F) for complete removal of the water of hydration. Scheduled alumina production would be 1,500 tons per day. The applicant proposes to use oil as fuel for the kiln because the ash from coal would contaminate the product. About 75,000 gallons (300 tons) of fuel oil, estimated to contain 1.35 percent sulfur, would be burned daily. Offgas from the alumina calciner would be passed through cyclone dust collectors to reclaim coarse particles, then scrubbed with a lime slurry for removal of 99 percent of the remaining particulates, 80 percent of the SO_2, 99.6 percent of the SO_3 and 20 percent of the NO_x. This lime scrubbing would remove daily an estimated 50,000 pounds of particulates, 13,000 pounds of SO_2, 200 pounds of SO_3 and 1,200 pounds of NO_x. Emissions to the atmosphere, per day, through two 400-foot tall stacks, would be 500 pounds of particulates, 3,200 pounds of SO_2, 4,800 pounds of NO_x and 300 pounds of unburned hydrocarbons. Dust generated during storage and shipping of alumina would be collected in a baghouse which would capture about 60,000 pounds of dust per day. Particulate emissions of about 250 pounds per day would pass to the atmosphere from this source through a 160-foot tall stack.

Sulfuric acid plant. Alumet proposes to manufacture 3,000 tons of sulfuric acid per day by processing SO_2 gas derived from roasting alunite and from the burning of sulfur. About 90,000 standard cubic feet per minute of alunite roaster gas, containing 1,000 tons of SO_2 per day, would be converted to 1,500 tons per day of sulfuric acid. In addition, an equivalent amount of SO_2 gas from burning 500 tons of sulfur per day would also be converted to 1,500 tons per day of sulfuric acid. Sulfur combustion would yield a substantial amount of heat for use during processing. Use of a double contact acid plant, capable of 99.7 percent conversion efficiency, is proposed by the applicant. The acid plant tail gas would be scrubbed to further reduce SO_2 emissions. Figure 1-10 is a generalized flowsheet of the proposed acid plant. Multiple stages and complicated gas cooling and heating operations involving heat exchangers



SO_2 gas from alunite roasters and sulfur burners
Water
(1) Cool and wash SO_2 gas
Wet SO_2 gas
Wash water bleed
To tailings pond
(2) Precipitate fume and mist
Acid sludge
To tailings pond
Clean, wet SO_2 gas
(3) Dry SO_2 gas and dilute strong acid
98 % H_2SO_4
Dry SO_2 gas
(4) Convert SO_2 to SO_3
Split stream of 93 % H_2SO_4
Rich SO_3 gas
93 % H_2SO_4 product acid
To phosphate plant (see fig. 1-11)
(5) Absorb SO_3 in 98 % acid (H_2SO_4)
Depleted scrubbed gas
To atmosphere

Figure I–10
GENERALIZED FLOWSHEET OF SULFURIC ACID PLANT

are not shown. Individual operations, numbered to correspond with the flowsheet steps, are summarized as follows:

Step 1 - Cool and wash SO_2 gas. Gas assumed to contain 9.5 percent SO_2, as well as oxygen, nitrogen, carbon dioxide, and particulates, would be cooled, partly cleaned, and saturated with water in water spray chambers. Bleed slurry from the spray chamber would be discarded to the silica tailings pond.

Step 2 - Precipitate fume and mist. Wet gas from the spray chamber would be treated in wet electrostatic precipitators to remove mist, sulfur trioxide (SO_3) fume, and fine dust in the form of an acid sludge. This sludge would be discarded to the silica tailings pond.

Step 3 - Dry the SO_2 gas and dilute the strong acid. Wet, clean SO_2 gas would be dried by washing with a circulating stream of 93 percent sulfuric acid (H_2SO_4). The absorbed moisture would dilute the 93 percent acid; therefore, 98 percent H_2SO_4 would be added to maintain the desired grade of product acid. Part of the 93 percent acid leaving the drying tower would be recycled to step 5. The 3,000 tons per day of 93 percent product acid would be used in the phosphate fertilizer plant.

Step 4 - Convert SO_2 to SO_3. The clean, dry gas would contain oxygen (O_2) as well as SO_2. It would pass through a catalyst bed causing the SO_2 and O_2 to react, forming SO_3 gas. It is assumed that the hydrogen and carbon monoxide content of the converter feed gas would be low enough so that if reaction with oxygen occurs, temperature control in the catalyst bed would still be possible.

Step 5 - Absorb SO_3 in 93 percent acid. Sulfur trioxide-bearing gas from the converters would be washed with a circulating stream of 98 percent acid in the absorption tower. Sufficient 93 percent acid would be added to supply the required water to react with sulfur trioxide to maintain 98 percent sulfuric acid. The 98 percent acid would be bled off at the rate it is formed and fed to the drying process (step 3) to strengthen and maintain the 93 percent acid concentration in the drying step. The applicant estimates that spent gas from the absorbers would contain 300 parts per million SO_2. This gas would be scrubbed with lime slurry to remove 80 percent of the SO_2 (9,600 pounds per day) before being discharged to the atmosphere through a 220-foot tall stack. Sulfur dioxide emission to the atmosphere would be approximately 2,400 pounds per day.

Phosphate fertilizer plant. Alumet proposes to process about 5,000 tons of phosphate rock concentrate per day with sulfuric acid (which would be made in its own sulfuric acid plant) and purchased ammonia, with anticipated production of up to 3,500 tons per day of granular triple superphosphate (GTSP) and up to 2,300 tons per day of ammonium phosphates. Figure 1-11 is a generalized flowsheet of the proposed fertilizer plant. Individual operations, numbered to correspond with the flowsheet steps, are summarized as follows:

Step 1 - Dry grind coarsely. The coarsely ground phosphate rock concentrate from Soda Springs, Idaho (5,000 tons per day) would be mechanically unloaded from trains into covered storage. A baghouse, used for dust control in unloading and transferring the concentrate,

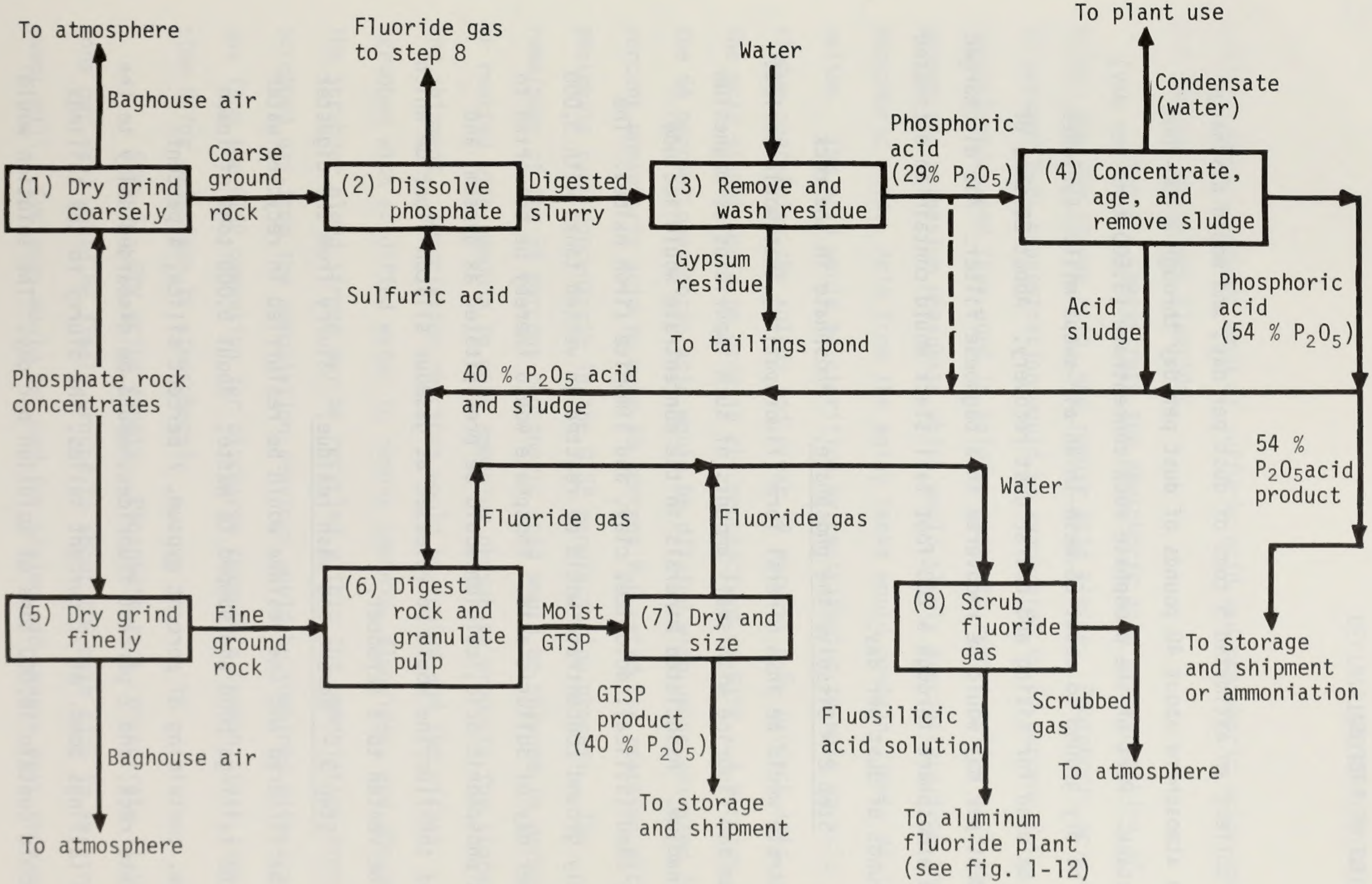


Figure I–II
GENERALIZED FLOWSHEET OF PHOSPHATE FERTILIZER PLANT

would collect an estimated 5 tons of dust per day, and would discharge to the atmosphere about 40 pounds of dust per day through a 200-foot tall stack. Part of the phosphate rock concentrate (3,500 tons per day) would be dry ground to about 65 mesh in an air-swept mill. Cyclones would be used for sizing and coarse dust recovery. About 20 tons of fine dust per day would be recovered in a baghouse filter. Air discharged to the atmosphere through a 200-foot tall stack would contain an estimated 150 pounds of dust per day.

Step 2 - Dissolve the phosphate. Phosphate in the rock concentrate would be in a mineral form (fluorapatite) that would include calcium and fluorine with small amounts of such impurities as magnesium and vanadium. Associated minerals in the concentrate would include quartz sand (silica), dolomite, clay, and limonite (iron oxide). The coarsely ground concentrate would be reacted in vented tanks with 3,000 tons per day of sulfuric acid. Phosphate would thereby be converted to liquid phosphoric acid, calcium would be precipitated as gypsum, and part of the fluorine would be released as gaseous silicon fluoride which would be vented to a scrubber.

Step 3 - Remove and wash residue. Slurry from the digester would be filtered and the residue would be reslurried in recycled water from the tailings pond and pumped to waste. About 5,000 tons of leach residue, containing 87 percent gypsum, 7 percent silica, 4 percent phosphate rock, and 2 percent fluorides, would be discarded daily to the gypsum tailings pond. At 22 percent solids, the slurry to the tailings pond would contain 18,000 tons of solution per day. The solution would contain about 1 percent each of sulfuric acid and phosphoric acid, and 0.5 percent dissolved fluorides.

Step 4 - Concentrate the phosphoric acid by evaporation of water, age the strong acid, and remove acid sludge. Phosphoric acid of 29 percent P_2O_5 concentration would be evaporated to 54 percent P_2O_5 concentration and then aged in holding tanks to remove solids such as gypsum and magnesium phosphate which would slowly precipitate from the phosphoric acid. Acid from the aging tanks would contain finely divided solids. The acid would be clarified by centrifuging to make an acid sludge containing the solids and clear 54 percent P_2O_5 product acid. The acid sludge would be used in the manufacture of GTSP. A portion of the 54 percent phosphoric acid would be diluted with unconcentrated 29 percent phosphoric acid to make 40 percent P_2O_5 acid for reaction with phosphate rock concentrate in the GTSP manufacturing process. The remainder of the 54 percent phosphoric acid would be shipped to markets, or reacted with ammonia to make ammonium phosphate products for storage and shipment. Ammoniation reactors would be vented and the offgas scrubbed with acidified water to remove ammonia, fluorides, and phosphates. The scrubber bleed stream may be recycled within the ammoniation process. Scrubbed gas from the ammoniation reactors would be combined with scrubbed gas from the GTSP operation for discharge through a common stack (see step 8 for emissions to atmosphere).

Step 5 - Dry grind finely. Phosphate rock concentrate (1,500 tons per day) would be finely ground to about 200 mesh size in an air-swept mill. Cyclones would be used for sizing and coarse dust recovery.

A baghouse filter would capture about 44 tons of fine dust per day and emit to the atmosphere 350 pounds of dust per day through a 200-foot tall stack.

Step 6 - Digest rock and granulate slurry. Finely ground phosphate rock concentrate would be digested in hot 40 percent phosphoric acid in vented tanks. The tricalcium phosphate component of the rock would decompose with the formation of calcium acid phosphates that would serve as fertilizer. The slurry from the digestors would be sprayed onto a rolling bed of recycled dry particles of GTSP causing the seed particles to grow to product size. Dust and fluoride gas would be removed by scrubbing the vent gas.

Step 7 - Dry and size. Moist pellets of GTSP would be dried in a rotary kiln using steam heated air. The drier discharge would be screened to remove GTSP of product specification size, plus fine and oversize material for recycling. The oversize material would be crushed before recycling to the granulator (step 6). Dust and fluoride gas would be removed by scrubbing the vent and kiln gas. The GTSP product, containing 46 percent phosphorus pentoxide, would be stored and shipped. Dusts and fluoride generated in storage and shipping of GTSP and ammoniated phosphate would be removed by scrubbing. Scrubber bleed streams may be recycled within the GTSP plant. Estimated emission of particulates and fluorides to the atmosphere, through a 260-foot tall stack, would be 250 pounds of particulates and 40 pounds of fluorides per day.

Step 8 - Scrub fluorides. Gases containing hydrogen fluoride and silicon tetrafluoride from the phosphoric acid and GTSP plants would be collected and scrubbed with water. The resultant solution of fluosilic acid would be processed for the manufacture of aluminum fluoride. Scrubber emissions would be combined with scrubbed gas from ammoniation operations for discharge to the atmosphere through a 260-foot tall stack. The estimated, combined daily discharge would be 1,300 pounds of particulates, 380 pounds of fluorides, and 420 pounds of ammonia.

Aluminum fluoride plant. Alumet proposes the production of up to 20,000 tons of aluminum fluoride per year by reacting alumina trihydrate ($A\ell_2O_3 \cdot 3H_2O$), diverted from the alumina plant, with fluosilicic acid, recovered from the fluoride scrubbers in the phosphate fertilizer plant. Figure 1-12 is a generalized flowsheet of the proposed aluminum fluoride plant. Individual operations, numbered to correspond with the flowsheet steps, are summarized as follows:

Step 1 - React fluosilicic acid and alumina trihydrate. Fluosilicic acid solution of approximately 18 percent strength would be preheated and batch-mixed with aluminum trihydrate in a vented tank. The reaction would yield a precipitate of fine silica and a solution of aluminum fluoride.

Step 2 - Remove silica. Slurry from the reactors would be quickly centrifuged to remove the silica before aluminum fluoride precipitation began. The silica, amounting to about 30 tons per day and containing about 3 percent aluminum fluoride, would be reslurried as waste solution and discarded in the gypsum tailings pond.

Step 3 - Crystallize and remove aluminum fluoride trihydrate. Solution from the centrifuge would be aged for several hours at a controlled

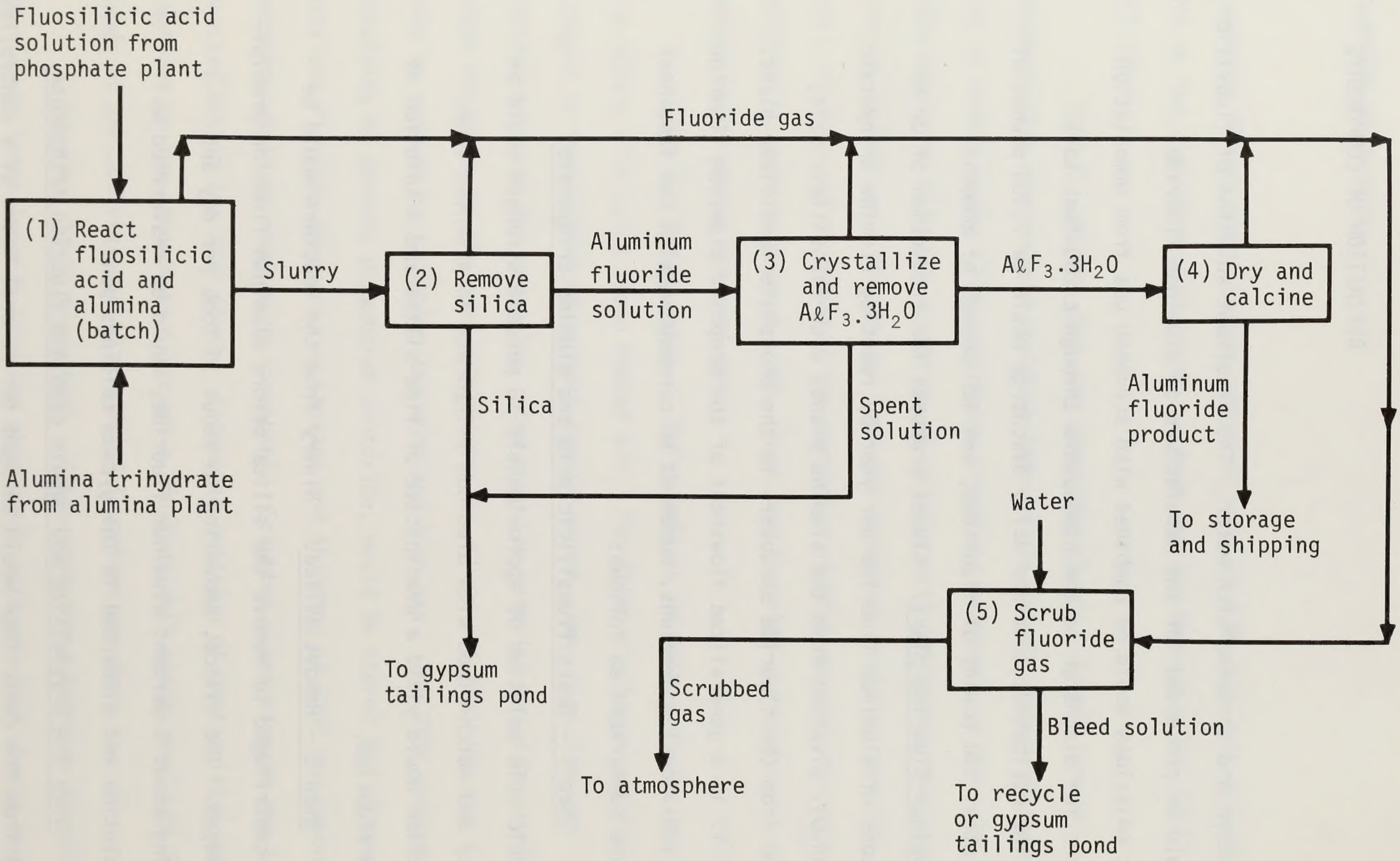

Fluosilicic acid solution from phosphate plant
Fluoride gas
(1) React fluosilicic acid and alumina (batch)
Slurry
(2) Remove silica
Aluminum fluoride solution
(3) Crystallize and remove $A\ell F_3.3H_2O$
$A\ell F_3.3H_2O$
(4) Dry and calcine
Silica
Spent solution
Aluminum fluoride product
Alumina trihydrate from alumina plant
Water
To storage and shipping
(5) Scrub fluoride gas
To gypsum tailings pond
Scrubbed gas
Bleed solution
To atmosphere
To recycle or gypsum tailings pond

Figure I-12
GENERALIZED FLOWSHEET OF ALUMINUM FLUORIDE PLANT

temperature to crystallize aluminum fluoride trihydrate. The slurry would then be centrifuged to remove the crystals. The spent solution would contain approximately 3 percent alumina fluoride plus a small amount of residual fluosilicic acid. If very low in phosphate content, the solution would be recycled for scrubbing fluoride gas; otherwise, solution would be discarded to the gypsum tailings pond.

Step 4 - Dry and calcine aluminum fluoride. Moist aluminum fluoride trihydrate would be dried at a low temperature to remove entrained water, followed by calcining at a high temperature to remove combined water. The resultant product, 62 tons per day of 96 percent grade aluminum fluoride, would be stored for shipment to markets. Dust generated in storage and shipping would be collected in a baghouse filter for recycling. About 250 pounds per day would be discharged to the atmosphere through a 160-foot tall stack.

Step 5 - Scrub fluoride gas. Vent gas containing dusts and gaseous fluorides from steps 1 through 4 would be scrubbed with water. Bleed solution from the scrubber would be recycled, or discarded to the gypsum tailings pond if high in phosphate. Scrubbed gas, discharged to the atmosphere through a 200-foot tall stack, would contain approximately 3 pounds of solid fluorides and 30 pounds of gaseous fluorides per day.

Power generating plant. To meet the need for electric power and process steam, Alumet proposes to provide three 25-megawatt coal-fired, steam-electric generating units. Each of the three stoker-fed boilers would be traveling-grate models burning pulverized coal and equipped with continuous blowdown and bottom ash disposal systems. Separate emission control equipment and 460-foot high stacks would be provided for each boiler. Electrostatic precipitators would remove fly ash and wet lime scrubbers would remove sulfur dioxide from the combustion gas. Water would be demineralized for boiler use; spent steam and condensate would be cooled in towers for reuse. Auxiliary power would be supplied by diesel electric generators.

The lowest quality coal being considered for use by Alumet would yield 11,500 Btu per pound, contain 1.5 percent sulfur and 13 percent ash. Incoming coal would be mechanically unloaded to covered storage, then pulverized for use. About 1,700 tons of coal would be burned daily. Of this amount, process steam requirements are equivalent to 920 tons of coal daily. The combustion of 1,700 tons of coal a day would result in 220 tons of ash, 51 tons of SO_2 and 15 tons of NO_x. Electrostatic precipitators would remove 173 tons of fly ash per day from the combustion gas. This fly ash plus 45 tons per day of bottom ash would be slurried in waste water and pumped to the silica tailings pond. Additional ash, 90 percent of the SO_2 and 20 percent of the NO_x would be removed by wet lime scrubbers using 42 tons of lime per day. The resultant slurry of ash, unreacted lime, calcium sulfite, and calcium sulfate (90 tons of solids per day) would be pumped to the silica tailings pond. Daily emissions to the atmosphere would be 3,500 pounds of particulates, 9,500 pounds of SO_2, and 21,000 pounds of NO_x.

Alumet estimates that other discharges from the power plant would include the equivalent of 75 gallons per minute of water as vapor from the cooling tower, and 450 tons (75 gallons per minute) of boiler blowdown and cooling tower bleed water per day which would be used in slurrying the power plant ash.

Support facilities. Various support facilities would be located within the security-fenced perimeter of the 150-acre processing plant complex. These facilities include offices, shops, changehouse, warehouses, laboratories, water treatment, storage, and distribution, sewage collection, part of the electrical distribution system, steam and hot water distribution systems, part of the telephone system, rail trackage, roads, and parking areas.

Water requirements. Alumet has estimated the average requirements for makeup water, independent of internal recycle, would be 4,704 gallons per minute or 20.8 acre-feet per day. Additives and exit points are shown in table 1-5. At an assumed average of 330 operating days per year, the annual requirement for new water would be about 6,860 acre-feet. Since evaporation from tailings ponds (average 3.8 acre-feet per day) would occur even when the plant complex was not operating, annual water requirement would be larger. Daily evaporation from tailings ponds could be much higher or lower than the averages in table 1-5 depending on the season and weather. Water requirements would vary accordingly.

Summary of daily emissions and tailings from the processing plant complex. Emissions from the processing plant complex are summarized in table 1-6.

Table 1-5. Water requirements and disposition

	(gallons per minute)		
Process	Added	Evaporated	Combined in products or tailings mud
Mine, primary crush	20	--	--
Secondary and tertiary crush, grind	220	--	--
Calcine and roast	356	496	--
Potassium sulfate	858	148	10
Alumina	1,410	810	--
Sulfuric acid	615	600	--
Phosphate and fluoride	980	--	65
Power plant	225	75	--
Domestic use	20	--	--
Silica tailing pond	--	660	790
Gypsum tailing pond		200	830
Sewage lagoon		20	
Total	4,704	3,009	1,695

Table 1-6. Summary of daily emission and tailings from processing plant complex

Operation or plant	Air emissions, pounds per day				Tail solids (dry)		Tail solution	
	Partic-ulate	SO_2	NO_x	Fluoride	Tons	Composition, %	Tons	Composition, %
Crush and grind	2,100	--	--	--	--	--	--	--
Roast the ore	3,800	22,800	17,000	--	--	--	--	--
Sulfuric acid	--	2,400	--	--	--	--	--	--
Potassium sulfate	350	--	--	--	--	--	850	12% potassium sulfate, 5% sodium sulfate, 0.23% alumina, 0.33% sodium hydroxide
Alumina	750	3,200	4,800	--	7,800 50	91% silica, 3% alumina, 6% iron oxide and other hydrated lime and silica compounds	11,700	0.3% sodium carbonate 0.23% alumina, 0.33% sodium hydroxide
Phosphate	2,100	[a] 400	--	420	5,000	87% gypsum, 7% silica 4% phosphate rock, 2% fluorides	18,000	1% sulfuric acid, 1% phosphoric acid, 0.5% fluorides
Aluminum fluoride	250	--	--	[b] 32	30	Silica with 3% aluminum fluoride	45	Gypsum pond solution, spent leach liquor-3% aluminum fluoride
Power and steam generation	3,500	9,500	21,000	--	220	Ash	450	Boiler blowdown water
SO_2 Scrubbers	--	--	--	--	700	Unreacted lime, calcium sulfite and calcium sulfate	2,800	Silica pond solution
Support facilities	--	--	--	--	3	Trash and garbage	1,200	Sewage
Total	12,850	37,900	42,800	452				

Note: Data not included for bleed streams from several wet scrubbers.

[a] Ammonia.

[b] Includes 3 lbs. of particulate fluorides.

Waste disposal - tailings ponds. Separate silica sand and gypsum tailings ponds would receive tailings and other wastes from the processing plant complex. The ponds would be located directly north of the complex site (fig. 1-2) on permeable, unconsolidated valley fill deposits. The floors of the pond areas would be compacted to reduce permeability of the underlying material and earthen dikes would be constructed to impound the tailings. The dikes would be designed with 2.5:1 slopes on the inside faces and 2:1 slopes on the outside faces. A 12-foot wide roadway would be established on top of each dike. Dikes would be stabilized as necessary against erosion by the use of vegetation and mechanical or chemical means and would be seeded with vegetation immediately after construction. The dikes would be compacted to reduce their permeability and, if necessary, the inner faces would be cooled with an unpermeable material to reduce seepage losses.

Material for construction of the original dikes would be excavated from within the diked areas. Dry tailings, material from areas not yet covered by tailings, or cycloned tailings from the processing plant would be used to increase the height of the dikes as the ponds fill with tailings.

Two emergency spillways would be installed about 5 feet below the crest of each dike to drain excess storm runoff. Spillways would be designed to handle runoff from storms producing up to 8 inches of rain in 24 hours. (A storm of this magnitude is not likely to occur in this area.) A decant system in each pond would be used to recycle process water, and would be designed to handle 24,000 gallons per minute.

A 30-acre water reclaim pond would be built adjacent to each tailings pond. The bottoms of these reclaim ponds would be compacted to reduce seepage. Each pond would be 6 feet deep and have a storage capacity of 180 acre-feet. These ponds would receive recycled process water from the tailings pond, as well as excess storm runoff water via a drainage ditch that would be constructed around the perimeters of the tailings ponds. Pumping stations adjacent to each water reclaim pond would return the reclaimed water to the processing plant complex.

Construction of the processing plant complex would be underway before construction of the tailings and reclaim ponds would be started. Therefore, the transportation and utility systems needed to construct the tailings ponds and related facilities would be available.

During operation, the ponded tailings would be kept moist to control dust, but the applicant has not provided specific information as to how this would be accomplished. Restoration of the pond areas upon abandonment would include grading and stabilization with native vegetation.

Silica sand tailings pond. The silica sand tailings pond would eventually cover 675 acres. During the first 10 to 15 years of operation, this pond would be impounded by a 40-foot high dike. With continued operation, the height of the dike would be increased to 120 feet.

Silica sand tailings from the alunite plant would be pumped through a 3.7-mile slurry pipeline to the tailings pond. The silica sand tailings pond would also receive fly ash, bottom ash, gas scrubber effluent, cooling tower blowdown water from the power generating plant, and effluent from the sewage treatment plant. Ash from the power generating plant would be slurried with the cooling tower blowdown water. Quantities and character of tailings and other wastes that would be disposed of in the silica sand tailings pond are shown in table 1-7.

Excess water from the silica sand tailings pond would be drained to the adjacent reclaim water pond and pumped back to the alunite plant via a 1.7-mile long reclaim water line.

Gypsum tailings pond. The gypsum tailings pond would eventually cover 575 acres and receive an estimated 1.6 million tons of tailings per year from the aluminum fluoride and phosphate fertilizer plants. During the first 10 to 15 years this pond would be impounded by 40-foot high dikes. With continued operation, the height of the dike would be increased to 80 feet. The gypsum tailings would be pumped from the source plants in water slurry to the gypsum tailings pond via a 5.1-mile long slurry line. Table 1-8 shows the character and quantities of tailings that would enter the gypsum tailings pond.

Washing water from the phosphoric acid unit and reclaim water from the gypsum tailings pond would be used for the water slurry. Any required makeup water would be supplied from the Wah Wah Valley well field. Water would be decanted to a holding pond via a 0.4-mile pipeline, then returned to the phosphate fertilizer plant via a 2.6-mile pipeline.

Valley fill materials from beneath a portion of the tailings area (100 to 200 acres) would be excavated to a depth of 5 to 10 feet and

Table 1-7. Quantity and character of material that would be placed in the silica sand tailings pond

Source of material	Slurry solution[a]			Slurry solids (dry)		
	Ton/day	Ton/year[b]	Composition (percent)	Ton/day	Ton/year[b]	Composition (percent)
Potassium sulfate plant	850	280,500	K_2SO_4 (12) $NaSO_4$ (5)			
Alunite plant	11,700	3,869,000	$A\ell_2O_3$ (0.23) NaOH (0.33) Na_2CO_3 (0.3)	7,800	2,574,000	Silica (91)[c] Alumina (3) Iron oxides and other minerals (6)
				50	16,500	Hydrated lime and silica
Power and steam generation plant	450	148,500	Boiler blowdown water	220	72,600	Fly and bottom ash
SO_2 scrubbers	2,800	924,000	Silica pond	700	231,000	Unreacted lime calcium sulfite and calcium sulfate
Support facilities	1,200	396,000	Sewage	3	990	Trash and garbage sewage sludge
Total	17,000	5,618,000		8,770	2,894,100	

[a] Decant water would be recycled through processing plant water system.
[b] Based on an average of 330 days per year operation.
[c] Grain size 0.02-0.15 mm.

Table 1-8. Quantity and character of material that would be placed in the gypsum tailings pond

Source of material	Slurry solution			Slurry solids dry		
	Ton/day	Ton/year[a]	Composition (percent)	Ton/day	Ton/year[a]	Composition (percent)
Phosphate fertilizer plant	18,000	5,940,000	H_2SO_4 (1) H_3PO_4 (1) Fluorides (0.5)	5,000	1,650,000	Gypsum (87)[b] Silica (7) Phosphate rock (4) Fluorides (2)
Aluminum fluoride plant	45	14,850	$A\ell F_3$ (3)	30	9,900	Silica (97)[c] $A\ell F_3$ (3)

[a] Based on an average of 330 days per year operation.

[b] Grain size 0.065-0.27 mm

[c] Grain size < 0.325

stockpiled. The abandoned pond would be capped with a layer of material from the silica sand tailings pond. This layer would serve as a buffer to reduce percolation of growth-limiting substances from the underlying gypsum tailings. The silica sand layer would be covered with the stockpiled valley fill material to a depth of 6 to 12 inches. Prior to revegetation, the valley fill would be treated with soil amendments and fertilizers, as necessary.

Sewage. The permanent sewage disposal facility proposed for the mine area would not be available during the earliest stages of construction in that area. The permanent sewage treatment and disposal system proposed for the processing plant complex area would not be available until the middle stages of construction in that area. Interim sanitation facilities would be maintained in both areas by the use of portable chemical toilet units of an approved type. The number of units would be determined by the distribution of work crews in the respective construction areas. Sewage from the chemical toilets would be disposed of in the nearest municipal sewage treatment facility of suitable capacity (such as the sewage plant at Milford), subject to approval of the facility operators. Early in the construction of the processing plant, a septic tank and leach line system would be installed; this temporary system would be abandoned following completion of the permanent treatment facility.

Since the proposed mine and processing plant complex would be separated by about 5 miles, each would be served by a separate sewage treatment and disposal system. The system for the proposed mine would consist of individual septic tank/collector/leach line systems for each building that would have toilet or washhouse facilities. Final design and locations of these systems would depend on anticipated sewage loads and character of rock materials that would accommodate the leach fields. Individual collector lines would join and one line would continue to the leach field which would be located about a mile northwest of the mine facilities (fig. 1-4).

The sewage treatment system for the processing plant complex would be of the lagoon type, from which effluent would be pumped to the silica sand tailings pond. Final design and operation of this system would be based on availability of equipment and treatment requirements, but would conform to regulations of the State of Utah and Beaver County. The facility would be located near the processing plant complex. Sewage from individual buildings would be piped to a sewage collection system that would empty into the treatment facility. The lagoon system would cover about 3.5 acres and operation would be based on a maximum daily plant work force of 1,200 employees and a maximum loading rate of 20 pounds biochemical oxygen demand per acre. Primary and secondary treatment would remove suspended solids and dissolved organics. Sludge from the lagoon would be treated and either disposed of in the silica sand tailings pond or stockpiled for use in reclamation of abandoned tailings ponds.

Solid waste. Solid wastes accumulating during construction at the mine and processing plant complex would be stored in appropriate containers or piles near waste generating sources. The wastes would include unused portions of construction materials including glass, concrete, wood, brick, plaster, asphalt, and various metals. These wastes would be collected and transported to one or more approved sanitary landfill waste disposal areas which would be opened for solid waste disposal.

Following the construction phase, approximately 3 tons of solid waste per day would be produced during operations at the proposed mine and processing plant complex, which would be disposed of in one or more sanitary landfills located east of the processing plant (see fig. 1-2). These landfills would be developed and operated according to State of Utah and Beaver County guidelines. Operation of the landfills would include trenching, deposition of wastes, backfilling, grading, surface restoration, and revegetation.

Approved landfill sites would be selected and opened during the early stages of construction at the mine facilities and processing plant complex, and would be available for immediate disposal of wastes produced during later stages of construction. An estimated 40 acres would be required for disposal of all solid waste produced by the proposed project.

Water system. The proposed mine and processing plant complex would be served by separate water systems; both systems would utilize ground water pumped from deep wells. An application (No. 43362), to appropriate 45 cubic feet per second of ground water annually from Wah Wah Valley to construct and operate the proposed processing plant, was approved in June 1975 by the Utah Division of Water Rights. Some of the wells drilled under this water right would be operative in time to supply water for construction of project components. The applicant has not estimated the volume of water needed to construct the proposed project; however, total construction water requirements probably would not exceed 1,000 acre-feet during the 42-month construction period.

Alunite mine. An estimated 32 acre-feet of water per year would be needed to operate the mine. Water requirements for the proposed mining operation are discussed in the alunite mining section of this chapter.

The water system for the proposed mine would consist of two wells located near the mine (fig. 1-4), a storage tank, and a water distribution system. In the event the mine well water would not meet drinking water quality standards required by the Utah Division of Health, the system would also include a treatment facility, including a chlorinator, for the culinary water supply. Details regarding the water distribution system and treatment facility (if required) would depend on final design of the proposed mine and related facilities.

Processing plant complex. Assuming a 365-day per year operation, a maximum of 7,590 acre-feet of water per year would be needed annually to operate the processing plant complex and related facilities. Water requirements for the specific processing plant operations are discussed in the processing plant complex section of this chapter.

The water system for the processing plant complex would consist of a well field located in the southern portion of Wah Wah Valley including water collection and trunk lines (fig. 1-2), a water distribution system and a demineralizer facility for boiler feed water. A treatment facility (including chlorinator) would also be included for culinary water, should such a facility be needed to comply with the drinking water quality requirements of the Utah Division of Health. The treated water would be stored in a 100,000-gallon culinary water storage tank. Process water would be stored in a 1.5-million gallon storage tank.

Based on preliminary exploratory well data, the applicant estimates that 10 to 20 wells, each 12 to 20 inches in diameter, would be necessary for the required water supply. These wells would range from 800 feet to more than 1,500 feet deep. As many as 50 well sites have been selected from which the 10 to 20 production well locations would be chosen to provide maximum water production. Several potential production wells have been completed as part of the exploratory well program (fig. 1-2). Some of the nonproducing wells would be used for water level observation. The water level data collected would be used to develop a pumping schedule for development of the ground water reservoir.

The producing wells would be equipped with submersible pumps powered by electric motors connected to the power generating plant. Pump and motor specifications for each well would be determined by two factors: pump test data collected upon completion of the well, and location of each well in the well field. The pump test data would also be used to design the well field and pumping program for optimal development of the ground water reservoir.

Total length of the water collection lines to producing wells and the trunk line to the processing plant complex would be about 18 miles. About 15 miles of these lines would cross national resource lands; about 3 miles would cross state lands. Total area occupied by the water system including well sites, pipelines, utilities, and service roads would be 220 acres.

The required water treatment facilities, storage tanks, and distribution lines would be integrated into the processing plant complex. Final layout and design would be based on further study conducted by the applicant.

Transportation systems. Alumet proposes to construct a transportation system consisting of several roads, a railroad spur, and an ore conveyor system. The completed system would be used for transporting personnel and equipment during the construction phase and for transporting personnel, large quantities of fuels, raw materials, and processed products during the operational life of the project complex. Figure 1-2 shows the location and interrelationship of each part of the proposed transportation system.

Roads. Two types of roads would be constructed: (1) major access roads, and (2) minor access and maintenance roads.

Three major access roads are identified on figure 1-2. They consist of a paved access road (R1) from existing Utah Highway 21 to the proposed plant site; a gravel haul road (R2) connecting the plant site and the proposed mine; and a gravel access road (R3) extending from the proposed plant complex to the Union Pacific Railroad near Thermo Siding.

Minor roads would include the road to the microwave site, the road connecting the plant site with the basalt quarry, and the water system service roads.

Road construction. Road R1 would cut off from Utah State Highway 21 at the Cactus Mine Road junction on the east side of Wah Wah Valley, and extend approximately 9 miles south-southwest to the proposed processing plant site.

Road R1 would be the first road developed and would provide access to the plant site during construction. Initially, this road would be graded and surfaced with gravel. After deliveries of heavy plant facilities and equipment have been completed the road surface would be paved. Preliminary surveys of route R1 have been completed by the Utah Department of Transportation. The Department of Transportation has not determined a design standard for this road at the present time, but states that the road would probably have a pavement width of 28 feet. This new highway would probably be constructed and maintained by Beaver County. Assuming a pavement width of 28 feet, this road would occupy approximately 90 acres.

Road R2 would begin at the proposed plant site and extend 6.6 miles southwest to the proposed mine area. This road would be located adjacent to the proposed ore conveyor system along most of its length. The Utah Department of Transportation has also completed preliminary survey work for R2, which would be the main access road to the mine area. Road R2 would be graded, gravel-surfaced, have a width of 60 feet and, where possible, would be built within the right-of-way of the ore conveyor. The road and ore conveyor system would occupy approximately 64 acres of national resource land.

Road R3 would run from the proposed plant site southeast approximately 20 miles to the Union Pacific Railroad line near Thermo Siding. The road would cross approximately 14 miles of national resource land, 4 miles of state land, and 2 miles of private land. This gravel-surfaced road would be constructed within the right-of-way of the proposed railroad spur. The primary function of R3 would be to provide access for the construction and maintenance of the railroad spur, as well as to provide a second access road into the processing plant complex from the southeast. Road R3 would tie into an existing network of Beaver and Iron county roads.

The applicant states that the minor access and maintenance roads would be designed and located to minimize surface disturbance. Alignment of this road network would be based on the final design and location of facilities served. These minor access roads would be surfaced with compacted gravel, as necessary, or left in a primitive state.

Parking lots would be established at the plant complex and mine area. These parking areas would be paved or gravel surfaced.

Road construction on all of the proposed roads would be keyed to the anticipated use of each road. Roadbed materials would be obtained from sand and gravel pits located in the Wah Wah Valley. (See Sand and gravel sources, this chapter.)

Alumet proposes that: (1) ditches, culverts, and other drainage control devices would be provided where necessary and storm sewers and cross drains would be of concrete or steel; (2) cut and fill banks would be stabilized against erosion by mechanical, chemical, and/or vegetative means, as necessary; (3) road rights-of-way would be fenced, as necessary.

Road construction and maintenance responsibility. Final decision has not been made as to who would finance the construction of the paved access road (R1). According to the applicant, it is likely that this highway would be constructed by Beaver County with funds supplied by both the county and state, and possibly, from the Federal Government. Beaver County would then assume maintenance responsibility.

Traffic over road R1 would be generated from three sources: (1) commuter, (2) service and supply, and (3) visitor. The applicant has supplied the following traffic projections: commuter traffic would range between 215 and 750 vehicles per day (depending upon how many employees commute by bus rather than private vehicles); service and supply traffic would be approximately five vehicles per day; visitor traffic would be insignificant in comparison to projected commuter traffic.

The plant to mine road (R2) and the road adjacent to the railroad (R3) would be constructed and maintained by the applicant. Traffic volumes for these roads have not been estimated by the applicant. It is assumed that traffic flow would be controlled by Alumet because of safety restrictions, and that traffic volumes would be low in comparison with the paved highway (R1).

Minor access and maintenance roads would be constructed and maintained by the applicant. The road to the microwave site would be constructed and maintained under the terms of the communication site right-of-way. The road to the basalt quarry would be constructed and maintained as a tramroad right-of-way. The roads to the water wells and the water line access roads would be constructed and maintained as a part of the rights-of-way for these facilities.

Railroad. The proposed railroad spur would begin at the Union Pacific mainline near Thermo Siding. From this point, the spur would be routed west and northwest, across a low divide between the Escalante Valley and Wah Wah Valley, and thence to the plant site. The spur would form a loop at the plant site which would eliminate the need for an extensive switchyard and turntable system (fig. 1-2). The total rail spur including the turn around loop would require approximately 21 miles of new construction and would cross 14 miles of national resource land, 4 miles of state land, and 3 miles of private land.

Railroad construction. The railroad spur would be a single track system, with an average grade of 0.7 percent and a maximum grade of 0.8 percent. Construction standards would comply with the specifications of the Union Pacific Railroad and would conform to standard engineering practice and to all applicable safety regulations.

The rail spur would be built within a 100-foot tramroad right-of-way. The area occupied by this right-of-way would be 245 acres.

Basalt for the railbed would be acquired from a quarry to be developed approximately 1 mile south of the proposed plant site. (See Basalt quarry section, this chapter.)

The applicant states that cross-drain culverts would be installed where necessary. These culverts would be concrete or steel and would be designed to handle the maximum probable drainage. Cut and fill slopes would be stabilized against erosion by mechanical, chemical, and/or vegetative means, as necessary.

Railroad operation and maintenance. Alumet states that they would bear the financial responsibility for building the railroad spur. A final decision as to who would operate and maintain the railroad has not been made, but it is likely that the Union Pacific Railroad would be the operator of the spur line, and that Union Pacific would ultimately purchase the railroad spur. Coal, phosphate rock, and other production materials would be shipped to the plant site by rail. Most of these materials would be transported by unit trains made up of 70 to 100 cars each. The total number of incoming unit trains would be approximately 530 per year (an average of one and one-half unit trains daily). Nearly 300 unit trains per year would be required to ship alumina and fertilizer products (an average of one unit train daily). Combining the estimates for incoming and outgoing rail shipments would result in an average of two and one-half trains per day.

Ore conveyor system. Alunite ore would be transported by a cross-country conveyor system extending from the mine area across approximately 4.9 miles of natural resource land and 1.7 miles of land to be acquired by the applicant to the processing plant complex (see Alunite mine section, this chapter). The conveyor would be built within a 100-foot wide tramroad right-of-way which would also include the mine access road (R2). The federal right-of-way would occupy approximately 60 acres. The applicant states that construction of the conveyor system would be initiated during the latter months of the project development.

Sand and gravel sources. The applicant estimates that approximately 500,000 cubic yards of sand and gravel would be required for roadbed construction and surfacing. An additional 100,000 cubic yards would be utilized as aggregate in concrete. Operations would include crushing, washing, stockpiling, loading, and hauling by trucks. There is a possibility that a concrete batch plant and/or an asphalt batch plant would be operated in one of the pit areas. However, definite plans have not been submitted by the applicant.

The applicant would obtain this material from new borrow pits developed in Wah Wah Valley. Figure 1-2 shows the location of three proposed borrow sites. Sand and gravel would come from any one or all of the three sites identified. Approximately 50 surface acres of land would be utilized.

Basalt quarry. Construction of the proposed railroad spur would require approximately 110,000 cubic yards of basalt for the railroad base.

The material would be obtained from a new quarry located about 1 mile south of the proposed plant site (fig. 1-2). Operations would include blasting, crushing, stockpiling, loading, and hauling by truck. Approximately 15 surface acres of land would be utilized.

Communication facilities. Both internal and external communication systems would be provided in support of the proposed mine and processing plant complex.

Internal communications using cable networks would be limited to the processing plant complex and mine service area. Internal communications to all other outlying facilities would employ two-way radio transceivers.

External communication would be based on an existing microwave repeater station located on a mountain peak south of Minersville. This station would provide relay to a proposed microwave tower which would be constructed near the plant site (see fig. 1-2). Approximately 2 miles of buried cable would connect this proposed tower to the alunite processing plant complex. The total area occupied by the communication site, including the service road and utility lines, would be approximately 7 acres.

Construction. Construction of the internal communications network would be the responsibility of the applicant, and would coincide with construction of the processing plant complex. Construction of the proposed microwave repeater station near the plant site would be undertaken by Mountain Bell Telephone. Access to the proposed microwave site would be provided by an unimproved road, running along the cable route.

Operation. Mountain Bell would be responsible for operation and maintenance of the external communication system. The applicant would provide for the operation and maintenance of the internal communication system.

Summary of land requirements for proposed project. Land requirements for all the components included in the Alumet proposal are presented in table 1-9.

Table 1-9. Summary of land requirements for proposed Alunite project

Project component	Occupied area
Alunite mining area	
Mine (including haul roads)	240 acres
Crusher, conveyor and mine access road	64 acres
Office and support buildings	8 acres
Spoil pile	175 acres
Processing plant complex	
Plant area (fenced)	150 acres
Tailings ponds (includes temporary construction camp)	1,250 acres
Water reclaim ponds (two)	60 acres
Sewage lagoon	4 acres
Solid waste disposal	40 acres
Water system (including utilities and access road) (right-of-way width=100 feet)	220 acres
Transportation system	
Railroad and adjacent gravel road (right-of-way width=100 feet)	245 acres
Paved highway (pavement width=28 feet)	90 acres
Construction materials	
Sand and gravel quarries	50 acres
Basalt quarry	15 acres
Communication facilities (including access road)	7 acres

Fuel requirements

Coal. Coal would provide most of the energy consumed by the proposed alunite complex. The 75-megawatt power plant and the alunite roasters would be coal fired. Alumet estimates that coal requirements for the complex would be between 800,000 and 1.1 million tons per year, depending on the Btu content of the coal used.

Coal would be supplied from company-owned mines or purchased commercially. After considerable discussion with the applicant, it is evident that a definite coal source for the proposed project cannot be identified. The project has a construction schedule of 42 months and because of changing economic factors and uncertainties of development capital, the applicant is not willing to commit to a specific coal source. For this reason, the Director of the Bureau of Land Management made the decision to proceed with preparation of this environmental statement without a specific coal source. In his decision, the Director pointed out that the environmental impacts associated with mining of up to 1.1 million tons of coal per year would be significant and would require specific environmental analysis if the coal were to come under federal jurisdiction. At this point in the process, purchase on the open market is the most likely source of coal. This coal could come from new federal leases or from expanded operations on existing federal leases. If this were to occur, the impacts associated with the mining operations would certainly be subject to federal environmental analysis. It is possible that such a coal source may already be under consideration in one of the Regional Coal Environmental Statements. If the coal were to come from a new or existing source on state or private leases, the Federal Government would have no jurisdiction and the environmental analysis requirements of the state where the coal was located would be applicable.

In order to provide data on probable emissions resulting from burning coal in the power plant and roasters, the applicant utilized a composite analysis of "worst case coal" from the various possible supply sources. The characteristics of this "worst case coal" are assumed to be 11,500 Btu per pound, 1.5 percent sulfur, and 13 percent ash. No trace mineral analysis is available.

Gasoline and diesel fuel. Gasoline and diesel oil would be used throughout the operational phase of the plant complex by vehicles transporting personnel and for trucks and other mobile equipment used in mining and maintenance. Diesel oil consumption would be approximately 620,000 gallons per year; no estimate is available for gasoline consumption.

The 20-megawatt diesel power plant which would be used to provide power during the construction phase of the plant complex would require 38,400 gallons of diesel fuel per day.

Fuel oil. Fuel oil would be used to calcine the alumina and aluminum fluoride. The applicant estimates that the total fuel oil consumption would be approximately 25 million gallons per year.

Labor force

Construction phase. The construction phase would require a full range of professional, skilled, semiskilled, and unskilled employees. Table 1-10 provides an estimated labor force breakdown, and table 1-11 shows the stages of implementation of this labor force during the construction and startup phases.

Table 1-10. Manning summary for construction phase - Alunite project

Category	Number	Percentage of total[a]
Pipefitters	360	30
Laborers	120	10
Operating engineers	108	9
Carpenters	108	9
Boilermakers	180	15
Ironworkers	108	9
Millwrights	108	9
Electricians	108	9
Total	1,200[b]	100

[a] The percentage of each category of worker would vary with the stage of construction and is, therefore, shown only to provide an approximation of the average need.

[b] Total number of construction workers would vary throughout the construction period, but would average about 1,200 employees.

Table 1-11. Implementation schedule for mine/plant construction and startup labor force - Alunite project

Mine/plant construction phase (see fig. 1-3)	Average manpower requirements
15-month level	150
18-month level	450
21-month level	900
24-month level	1,250
30-month level	1,800
33-month level	1,800
36-month level	1,700
39-month level	1,200
After 42-month level	0

Note: Months 1-14 would require few onsite workers, since most work during that period would be devoted to engineering.

Many of the construction personnel would be journeyman trade workers with special skills. These employees would be imported from other areas on a temporary basis until the phase of construction requiring their expertise was completed.

The size of the work force required for construction, and the need to import a substantial portion of this force from nonlocal areas, would require the establishment of special housing facilities. The applicant would provide a "singles-only" construction camp in the vicinity of the proposed plant site. This temporary camp would be located in an area proposed for the silica tailings pond. Construction of the camp would occur during the early stages of construction, probably upon completion of access road R1.

Utilities would be required to support the camp. Electrical power would be provided by diesel generators. A potable water supply would be provided initially by tank trucks. Later, as water demands increased, water would be piped in from the nearest existing exploratory well or a small water well would be developed in one of the nearby drainages. Culinary water would be treated as necessary to meet State Division of Health standards. Sanitation for the construction camp would be provided initially by chemical toilets, and later by a septic tank and leach system which would be abandoned following completion of the permanent sewage treatment system.

Some construction activities occurring in outlying areas, e.g., water well drilling, may require temporary housing facilities adjacent to the construction site. In such instances a small house trailer would be established near the work site.

Those construction personnel who desire to live with their families would be housed in existing nearby communities. The applicant states that the temporary, singles-only camp would house a maximum of 900 employees. The remainder of the construction workers, a projected quarterly maximum of 900 (of the 1,800 total), would be housed in local communities.

Operation phase. Manning of the mine/plant complex would begin during the construction phase and continue throughout the operational phase. An estimated 1,000 employees of all job categories (professional, skilled, semiskilled, and unskilled) would be required for full operation. Table 1-12 shows the applicant's estimated operational manning requirements, and table 1-13 indicates the stages of implementation of this operational labor force.

It is anticipated by Alumet that all operational employee housing would be provided in existing nearby communities.

Monitoring program

The applicant proposes a monitoring program designed to detect environmental contaminants produced during construction and operation of the mine and processing plant complex. This program would provide surveillance of ground water quality and atmospheric emissions and would be subject to verification and use by state and federal agencies responsible for enforcement of air and water quality regulations.

Ground water monitoring. Ground water monitoring would be accomplished by collecting and analyzing water samples from monitoring wells located adjacent to the processing plant complex. In addition, routine

Table 1-12. Manning summary for operational phase - Alunite project

Area	Number of employees
General management	76
Mining	83
Crushing and grinding	99
Roasting	40
Leaching and separation	63
Potassium sulfate plant	40
Sulfuric acid plant	22
Phosphate fertilizer plant	121
Alumina plant	259
Power plant	41
Unskilled and semiskilled laborers	150
Total	994

Table 1-13. Implementation schedule for operational labor force - Alunite project

Checkout, startup, and operation phase	Average manpower requirements
30-month level	80
33-month level	150
36-month level	230
39-month level	560
42-month level	800
45-month level and beyond	1,000

analysis of water produced from the Wah Wah Valley and mine area well fields would be conducted.

One monitoring well would be established down gradient from each of the two tailings ponds. Analysis would consist of a semiquantitative 69 element emission spectrographic scan and quantitative determinations of sulfur, fluoride, potassium, phosphate, and aluminum. Samples would be subjected periodically to total bacteria plate count and coliform bacteria tests. Radioactivity would also be determined from samples taken from these two wells.

Another monitoring well would be established down gradient from the sewage lagoon and sanitary landfill. Analysis of sample filtrates would consist of a semiquantitative 69 element emission spectrographic scan and quantitative determinations of phosphorus, nitrate and nitrite. Each sample would also be subjected to total bacteria plate counts and coliform bacteria tests.

Samples from these monitoring wells would be taken monthly for 1 year prior to operation of the components being monitored so that baseline conditions of water quality would be established. Upon commencement of operations, samples would be taken on a monthly basis for the first year. Prior to construction, the design, implementation, and operation of the tailings ponds and the ground water monitoring program would be subject to approval by U.S. Geological Survey and the State of Utah.

The Wah Wah Valley and mine area well fields would be sampled at biweekly intervals from the onset of operation. Each biweekly sample would be subject to total bacteria plate counts and coliform bacteria tests. During the first year of operation, one sample per month would be subject to chemical analysis; thereafter, chemical analysis would be conducted on an annual basis. Chemical analysis would be conducted on sample filtrates, and would consist of a semiquantitative 69 element emission spectrographic scan, and quantitative determinations of sulfur, fluoride, potassium, phosphate, aluminum, phosphorous, nitrate, and nitrite.

Atmospheric monitoring. The applicant proposes five approaches to monitoring atmospheric emissions from the processing complex:

1. Point source monitoring. Point sources would be monitored as required by the Utah State Division of Health. The gypsum tailings pond would be monitored to establish radiation levels. The applicant anticipates that this program would include the surveillance of opacity, particulates, sulfur dioxide, and nitrogen oxides in exhaust gases. The monitoring of gaseous and particulate fluorides would be required under the New Source Performance Standards.

2. Ambient air quality monitoring. Ambient air quality monitoring would be accomplished using two stations. One station would be established at a point upwind from the processing plant complex and would serve as a control data source. The second station would be established downwind from the processing plant complex. Actual locations of these stations would depend on prevailing wind direction, to be determined by studies currently underway. Parameters which would be monitored are: particulates, sulfur dioxide, gaseous fluorides, and nitrogen oxides.

3. Soils. Soils would be sampled and analyzed to monitor the incorporation of potential atmospheric pollutants into the surface soil

horizon. Sampling sites would be established in the four dominant plant communities: pinyon-juniper, mixed shrub-grass, shadscale, and revegetated. One sampling site would be defined in each plant community upwind from the processing plant complex to provide control data. Three sets of sampling sites (each set would consist of four sites), one in each of four plant communities would be defined downwind from the processing plant complex. Actual directions relative to wind flow would be determined by prevailing wind direction studies currently underway. One set of sampling sites would be located approximately 1 mile downwind from the processing plant complex; the second set would be located approximately 5 miles downwind. The third set would be located in the area of maximum frequency of high ambient air pollutant concentrations. This area would be determined by computer simulation studies currently being completed by Alumet.

Samples from these sites would be subject to chemical analyses as follows: semiquantitative 69 element emission spectrographic scan and quantitative determinations of sulfur, fluoride, aluminum, potassium, and phosphorus. In addition, each grid cell to be sampled would be scanned in place with a scintillation counter to monitor any changes in radioactivity.

4. Vegetation. Vegetation in each of the four major plant communities would be sampled and analyzed to monitor the deposition of potential atmospheric pollutants onto the surface, and incorporation into the tissues, of vegetation. Sampling sites would be superimposed upon those designated for soil monitoring. Samples would be taken from each sampling

site at the time soil samples are taken. Vegetation samples would be taken from the vegetation unit nearest each selected soil sample grid cell. Vegetation samples would consist of foliage from nongrass species, and total aboveground biomass for grasses.

Vegetation samples would be washed in an isotonic solution. The wash solution would then be analyzed to determine the presence of potential air pollutants on vegetation surfaces. The washed vegetation material would then be ashed and analyzed to determine the presence of potential air pollutants which may have been translocated to plant tissues from the soil. Chemical analyses would consist of a semiquantitative 69 element emission spectrographic scan, and quantitative determinations of sulfur, fluoride, aluminum, potassium, and phosphorus. Each vegetation unit to be sampled would also be scanned in place with a scintillation counter to monitor any changes in radioactivity.

In addition to the vegetation monitoring program presented above, vegetation along access road R1 would be sampled. These vegetation samples, taken at the same time as the soil samples, would be treated as discussed above, with the wash solution being analyzed for lead. The washed vegetation would be ashed and similarly analyzed to detect translocated lead.

5. Mammal blood. As a final check on the potential incorporation of air pollutants into the food web, mammals of certain species would be collected and samples of their blood subjected to analysis.

Live traps would be established in the areas of the upwind and downwind soil/vegetation sampling sites. It is anticipated that rodents and/or rabbits would serve as sample organisms so that potential incorporation of air pollutants into the food web can be determined at the primary consumer level. This sampling program would be conducted at monthly intervals for a period of 1 year prior to operation in order to establish baseline conditions. Thereafter, samples would be taken annually, with the time of sampling being determined by the normal cycles detected by the baseline sampling program.

Blood samples taken from captured mammals would be treated with an anticoagulant. The anticoagulated blood would be subjected to a semiquantitative 69 element emission spectrographic scan and a quantitative determination of fluoride.

Data summary and analysis guidelines

The information presented in table 1-14 is a summary of the data provided by the applicant and the analysis guidelines used in describing the proposed alunite project.

Table 1-14. Data summary and analysis guideline

Alunite mine	
1. Total lease area	13,828 acres
2. Initial mining area (area C)	240 acres
3. Ore mining rate	Approximately 4 million tons per year
4. Cross-country ore conveyor system	
Length	6.6 miles
Area (100-foot right-of-way)	80 acres
Disturbed area (disturbed width=80 feet)	64 acres
5. Mine offices and shops	8 acres
6. Waste dumps (project life - 25 years)	
Volume (including mine pit backfill)	82 million tons
Area covered (excluding mine pit backfill)	175 acres
7. Ore reserves at proposed production rate	
Area C only	43 years
Areas A, B, C, D, and White Mountain	100 years
Processing plant complex (fenced area)	150 acres
1. Material requirements	
Alunite ore	Approximately 4 million tons per year
Phosphate rock	Up to 1.525 million tons per year

(continued)

Table 1-14 (continued)

Coal	Up to 1.15 million tons per year
Fuel oil	25 million gallons per year
Potassium hydroxide	Up to 100,000 tons per year
Sodium hydroxide	Up to 50,000 tons per year
Sulfur	150,000 tons per year
Ammonia	Up to 160,000 tons per year
Lime	120,000 tons per year
2. Materials produced	
Alumina	500,000 tons per year
Potassium sulfate fertilizer	Up to 370,000 tons per year
Phosphate fertilizers	
Granular triple superphosphates	Up to 1.1 million tons per year
Ammonium phosphates	Up to 605,000 tons per year
Aluminum fluoride	Up to 20,000 tons per year
3. Power generation plant	Three 25-megawatt units
4. Fuel requirements in addition to coal and fuel oil	
Diesel fuel for equipment	620,000 gallons per year

(continued)

Table 1-14 (continued)

Gasoline for equipment	Not estimated
Diesel fuel for 20-megawatt powerplant used during construction phase	38,400 gallons per day
5. Projected air emissions from processing plant	
Particulates	12,850 pounds per day
Sulfur dioxide	37,900 pounds per day
Ammonia	400 pounds per day
Nitrogen oxides	42,800 pounds per day
Fluoride	452 pounds per day
Waste disposal	
1. Silica sand tailing pond	
Area covered	675 acres
Volume	--
Slurry line from processing plant	3.7 miles
Water reclaim pond	30 acres
Decant water line to reclaim pond	0.6 miles
Reclaim water line to processing plant	1.7 miles
2. Gypsum tailing pond	
Area covered	575 acres
Tonnage	1.6 million tons per year
Slurry line from processing plant	5.1 miles
Water reclaim pond	30 acres

(continued)

Table 1-14 (continued)

Decant water line to reclaim pond	0.4 mile
Reclaim water line to processing plant	0.3 mile
3. Sewage treatment	
Mine	Septic tank and leach lines
Construction camps (temporary)	Chemical toilets, septic tank, and leach lines
Plant complex	Lagoon treatment system
Area covered	4 acres
4. Sanitary land fill	
Volume	3 tons per day
Disturbed area	40 acres
Labor force	
1. Construction period	42 months
Average number of construction workers	1,200 employees
Quarterly maximum number of construction workers	1,800 employees
2. Operation of processing plant and alunite mine	1,000 employees
3. Accommodation of labor force	
Construction force	
Singles-only camp at construction site	900 employees
Expansion of existing communities	Balance of construction force
Operational force	Expansion of existing communities

(continued)

Table 1-14 (continued)

Water system	
1. Alunite mine	
Source	Two water wells near mine
Consumption	32 acre-feet per year
Area (included in mine acreage estimates)	
2. Processing complex	
Source	10 to 20 wells in Wah Wah Valley
Consumption	Approximately 7,590 acre-feet per year
Area (100-foot right-of-way for pipeline, utilities and service roads)	220 acres
Disturbed area (30-foot width)	66 acres
Transportation system	
1. Road R1 (plant site to Highway 21)	
Length	9 miles
Disturbed area (right-of-way not required; disturbed width=80 feet)	90 acres
2. Road R2 (plant site to mine area)	
Length	6.6 miles
Area	Within conveyor right-of-way
3. Road R3 (plant site to Union Pacific Railroad)	
Length	20 miles
Area	Within railroad spur right-of-way

(continued)

Table 1-14 (concluded)

4. Railroad spur	
Length (including turn around loop)	21 miles
Area (100-foot right-of-way)	245 acres
Disturbed area (disturbed width=80 feet)	190 acres
Construction materials	
1. Sand and gravel	
Volume	600,000 cubic yards
Disturbed area	50 acres
2. Basalt	
Volume	110,000 cubic yards
Disturbed area	15 acres
Communication facilities	
Microwave repeater	
Buried cable	2 miles
Disturbed area (including service road)	7 acres
Operation schedule	
1. Alunite mine	305 days per year
2. Processing plant	Continuous operation

INTERRELATIONSHIPS WITH OTHER PROJECTS AND PROPOSALS

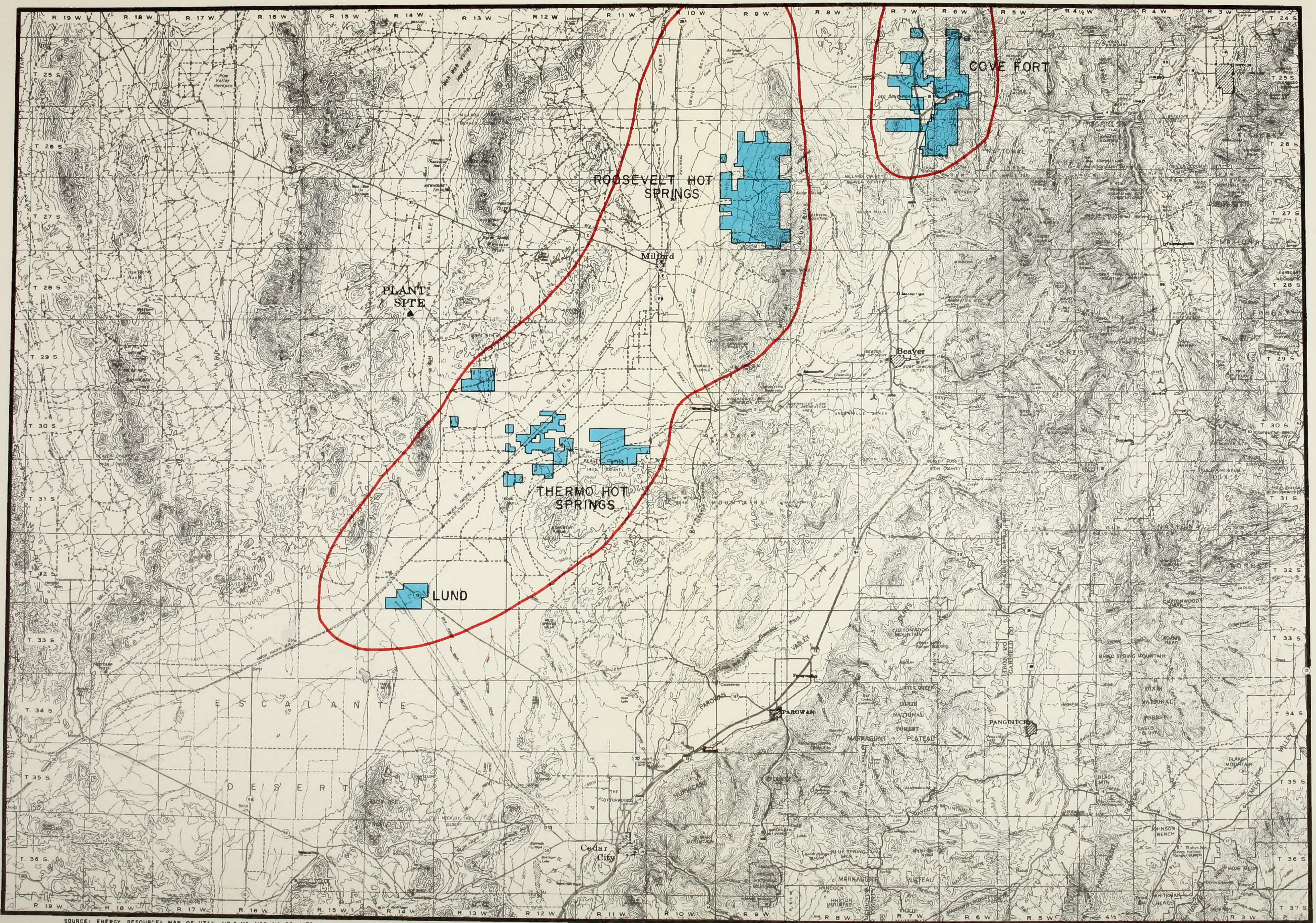
Geothermal development. There are several potential geothermal resource areas near Milford and in the Escalante Desert (see fig. 1-13). If developed, these geothermal resources would interrelate with the alunite project because socioeconomic impacts from geothermal development would be cumulative with those of the proposed alunite complex.

Roosevelt Hot Springs area. Geothermal test wells located approximately 15 miles northeast of Milford indicate that the geothermal resource may be adequate for development to produce electrical power. This area is known as Roosevelt Hot Springs. Geothermal leases for this area have been issued by BLM to Phillips Petroleum Company and others. Comprehensive test drilling of the Roosevelt area is planned for the next 2 years. If the geothermal resource proves to be adequate, an electrical generating plant could be constructed. It is anticipated that plant construction could begin in 1980 or 1981, continuing for about 2 years.

Based on the assumption that the geothermal generating plant would have a capacity of 250 megawatts, it is projected that manpower requirements would be:

Project level	Number of employees	Length of employment
Exploration	25	2 years
Construction	90	1 to 2 years
Operation and maintenance	54	continuous

Other geothermal resource areas. There are at least three other potential areas for geothermal development in the vicinity of the



SOURCE: ENERGY RESOURCES MAP OF UTAH, UG & MS MAP NO. 36, 1975

FIGURE I-13

LANDS POTENTIALLY
VALUABLE FOR
GEOTHERMAL DEVELOPMENT
ADJACENT TO
ALUNITE PROJECT SITE

alunite plant complex (see fig. 1-13). The geothermal potential of these areas is not known and only limited testing and exploration is taking place at the present time.

Phosphate mine. Alumet is proposing the development of a new phosphate mine and processing facility in southeastern Idaho. This proposal and other phosphate developments are being evaluated in an ES being prepared by U.S. Geological Survey, Bureau of Land Management, and the U.S. Forest Service (U.S. Department of the Interior DES-76-15).

CHAPTER 2

DESCRIPTION OF THE ENVIRONMENT
ALUNITE PROJECT AREA

CHAPTER 2

DESCRIPTION OF THE ENVIRONMENT

ALUNITE PROJECT AREA

INTRODUCTION

This chapter describes, in summary form, environmental components likely to be impacted by the proposed action. Discussions on environmental components relate to (1) the broader regional setting and aspects of ecological, social and economic interrelationships likely to be impacted, and (2) specific areas which would likely be impacted. The regional setting (geographic area of concern) varies with each environmental component. The project site is the specific area that would be directly impacted by construction of the project. Descriptions presented are designed to be commensurate with the expected magnitude, intensity, duration and incidence of impacts. A probable level of economic development, land use and related social/cultural factors of the impact areas and surrounding region without the proposal is also presented.

Members of an interdisciplinary team have prepared technical reports which contain detailed information on the environment. These reports are on file in the Cedar City District Office, BLM, Cedar City, Utah.

CLIMATE

Regional setting and project site. The geographic area described in figure 2-1 is the area of concern for the proposed project. This area of concern is based upon air movement patterns, topographic setting and estimates of lateral movement of air pollutants that would be generated at the project site.

The climate of southwestern Utah is semiarid continental. The principal source of moisture comes from the Pacific Ocean; however, storm systems moving in from the Pacific lose substantial amounts of moisture when crossing the Sierra Nevada Mountains so that precipitation over the region is greatly reduced. Climate is characterized, therefore, by low humidity and clear skies.

Because of the dominant north/south orientation of the mountains and valleys, the prevailing winds are channeled primarily from a southerly to southwesterly direction. Temperature and precipitation depend greatly on elevation.

Sources of data. Detailed climatological data based on 25 years of observations are available from the National Weather Service station located at the Milford airport. Meteorological data are also available from two stations located at the proposed project site set up by Greiner Environmental Sciences, which provide data for a 6-month period from April through September 1975. One station, referred to as the Lower Station, is located in the valley near the site of the proposed processing plant at an elevation of 5,750 feet above mean sea level. The Upper

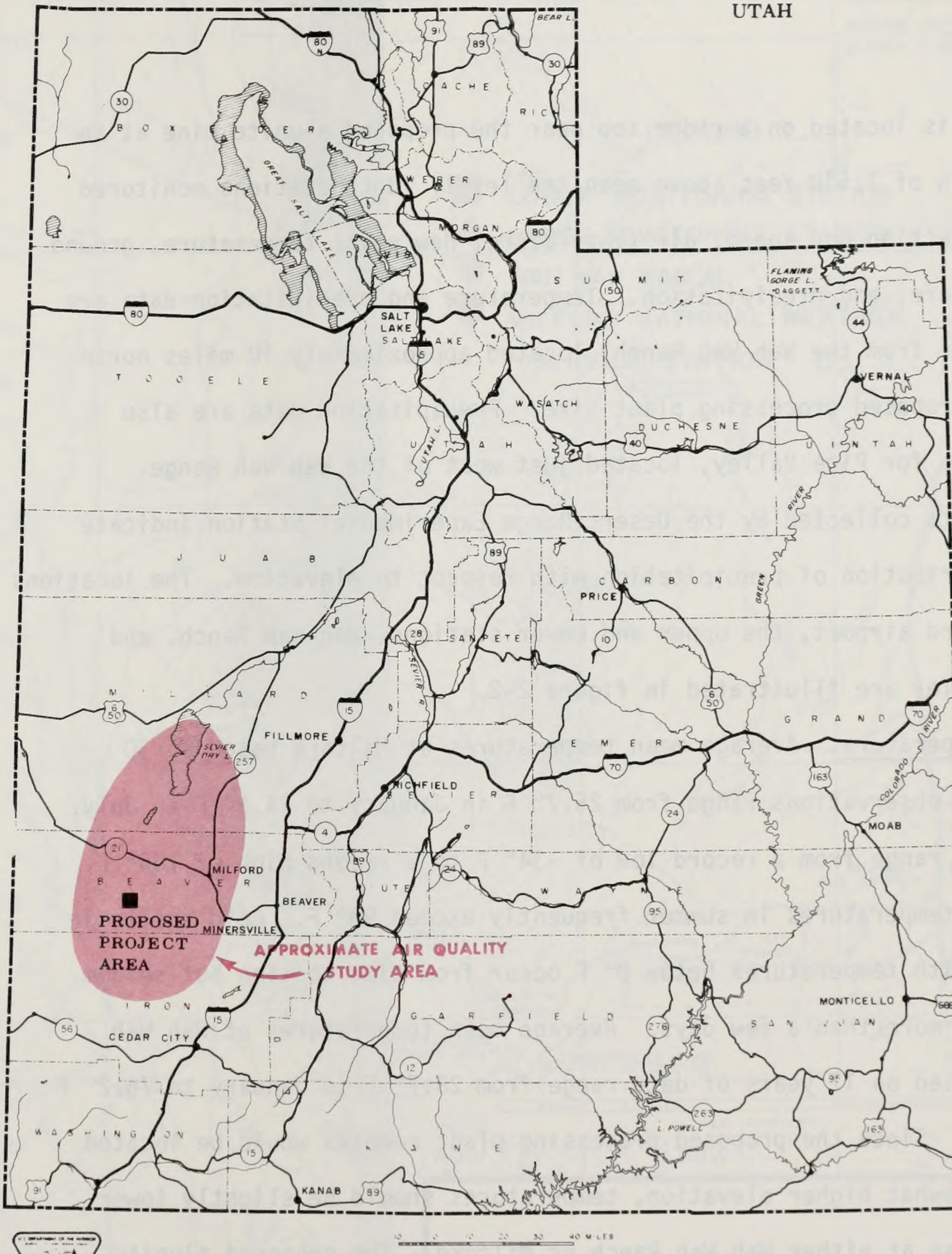


FIGURE 2-1

LOCATION OF PROPOSED ALUNITE PROJECT AND APPROXIMATE OUTLINE OF CLIMATE AND AIR QUALITY STUDY AREA

Station is located on a ridge top near the proposed alunite mine at an elevation of 7,570 feet above mean sea level. Both stations monitored wind direction and speed, air temperature, dew point temperature, ground temperature, and precipitation. Temperature and precipitation data are available from the Wah Wah Ranch, located approximately 10 miles north of the proposed processing plant site. Precipitation data are also available for Pine Valley, located just west of the Wah Wah Range. These data collected by the Desert Range Experimental Station indicate the distribution of precipitation with respect to elevation. The locations of Milford airport, the Upper and Lower stations, Wah Wah Ranch, and Pine Valley are illustrated in figure 2-2.

Temperature. Average mean temperatures at Milford based on 30 years of observations range from 25.7° F in January to 74.3° F in July. Extremes range from a record low of -34° F to a record high of 105° F. Maximum temperatures in summer frequently exceed 90° F. Cold spells in winter with temperatures below 0° F occur from time to time but seldom last for more than a few days. Average mean temperatures at Wah Wah Ranch based on 17 years of data range from 28.7° F in January to 76.2° F in July. Since the proposed processing plant complex would be located at a somewhat higher elevation, temperatures should be slightly lower than those at either Wah Wah Ranch or Milford. The proposed alunite mining area, which ranges in elevation from 6,400 feet to nearly 8,000 feet, would have generally lower temperatures than those at the proposed processing plant complex.

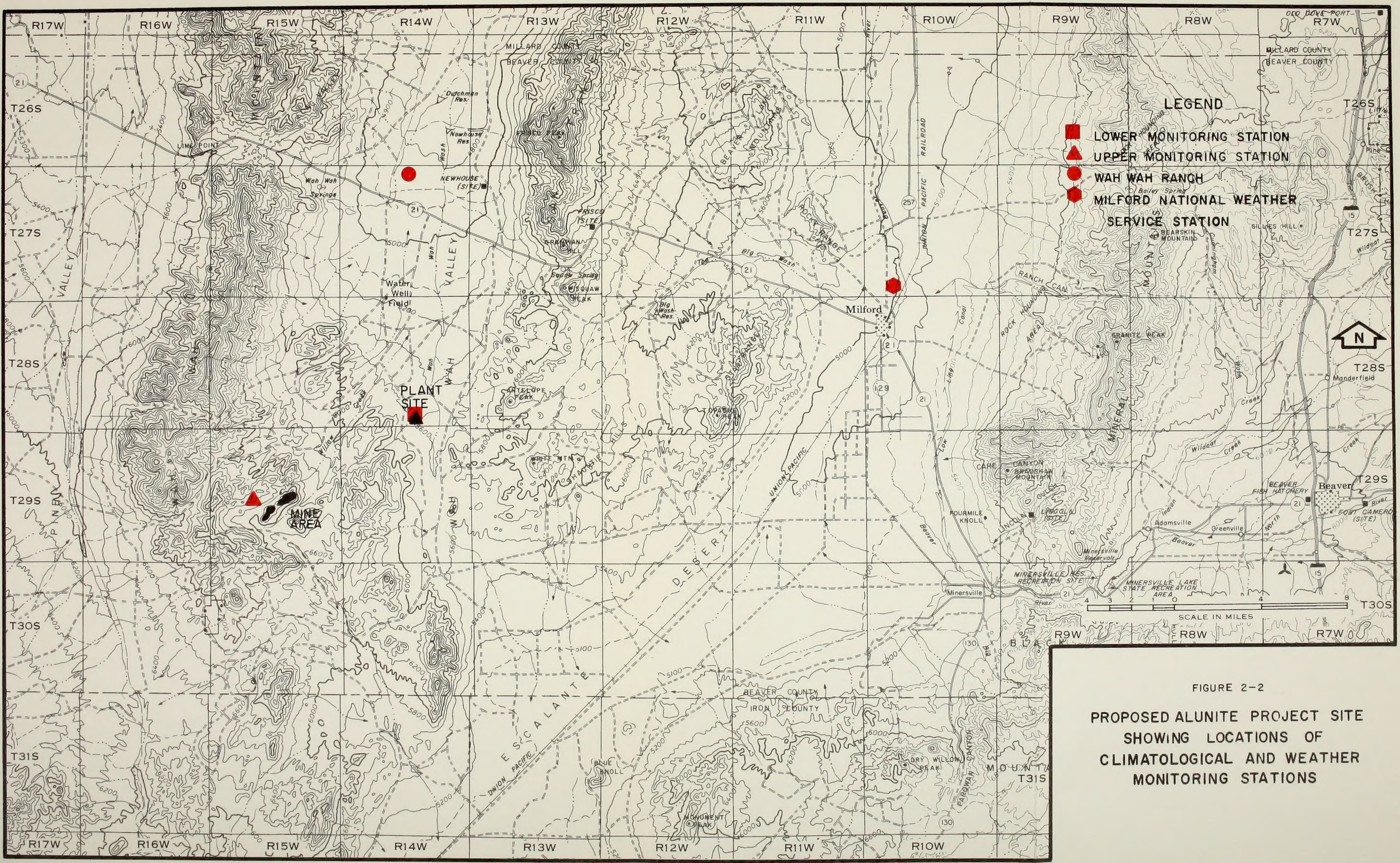


FIGURE 2-2

PROPOSED ALUNITE PROJECT SITE SHOWING LOCATIONS OF CLIMATOLOGICAL AND WEATHER MONITORING STATIONS

Humidity. Relative humidity in the area is generally low. At Milford, the mean relative humidity recorded at 5:00 p.m. local time ranges from 17 percent in July to 60 percent in January.

Precipitation. Average annual precipitation at Milford is 8.40 inches; monthly averages are listed in table 2-1. Precipitation is fairly evenly distributed throughout the year. Maximum precipitation occurs in March, while July is normally the driest month. Average annual snowfall is 44.3 inches. Average monthly precipitation data are available for Wah Wah Ranch based on 17 years of observations (table 2-1). The monthly distribution shows a different pattern from that recorded at Milford. Mean annual precipitation is 6.69 inches, with maximum average monthly precipitation occurring in August and the minimum in September. Annual precipitation is characterized by great variability, ranging from a minimum of 3.55 inches to a maximum of 10.11 inches.

Winter precipitation usually occurs in the form of snow. Snow cover in the valleys usually does not last for more than several days in succession. In the mountains, snowfall is occasionally heavy and snow cover generally remains throughout the winter season. Summer precipitation is mainly in the form of local showers and high intensity, short-duration storms.

Evaporation. Potential evaporation, as measured from an exposed pan of water at the Milford weather station over a 30-year period, averages 68.7 inches for the period May through October.

Table 2-1. Average monthly precipitation

	Milford (in inches)	Wah Wah Ranch
January	0.61	0.26
February	0.70	0.40
March	1.04	0.52
April	0.90	0.65
May	0.61	0.58
June	0.56	0.48
July	0.51	0.60
August	0.68	1.08
September	0.61	0.61
October	0.78	0.67
November	0.67	0.50
December	0.73	0.34
Annual	8.40	6.69

Sunshine and cloudiness. Percentage of possible sunshine at Milford varies from a minimum of 48 percent in November to a maximum of 85 percent in September. The average annual value is 67 percent.

Annually, there is an average number of 151 clear days (mainly summer), 102 partly cloudy and 112 cloudy days (mainly winter).

Fog. Fog or periods of low visibility are infrequent in the Milford area. On the average there are about 7 days annually with occurrence of heavy fog (visibility less than one-quarter of a mile).

Winds. The weather station at Milford is the only wind data source in the vicinity of the project site with records of sufficient duration for the determination of representative, average conditions. In addition, Greiner Environmental Sciences conducted a detailed analysis of wind data collected at Milford for the period July 1948 through June 1950, during which observations were recorded every 3 hours. After 1950, observations were taken only during daylight hours. The frequency distribution of wind direction for the entire period, illustrated in figure 2-3, shows that wind direction is predominantly between south and southwest; a secondary maximum in frequency occurs from the north. This frequency distribution shows little seasonal variation. Mean wind speeds by month and wind direction are given in table 2-2 indicating that mean wind speeds vary little with time of year, and range from a maximum of 12.0 miles per hour in January to a minimum of 8.3 miles per hour in November. The table also shows that wind directions from south to southwest are associated with higher than average wind speeds. On the other hand, winds from an easterly or westerly direction are much weaker than average, indicating the strong channeling action caused by the San Francisco Mountains to the west and the Mineral Mountains to the east.

The Lower and Upper weather monitoring stations near the proposed project site recorded winds from April through September 1975. The frequency distribution of wind direction obtained from the Lower Station showed winds from a northerly direction almost as frequently as from a southerly direction. Wind directions from either the westerly or

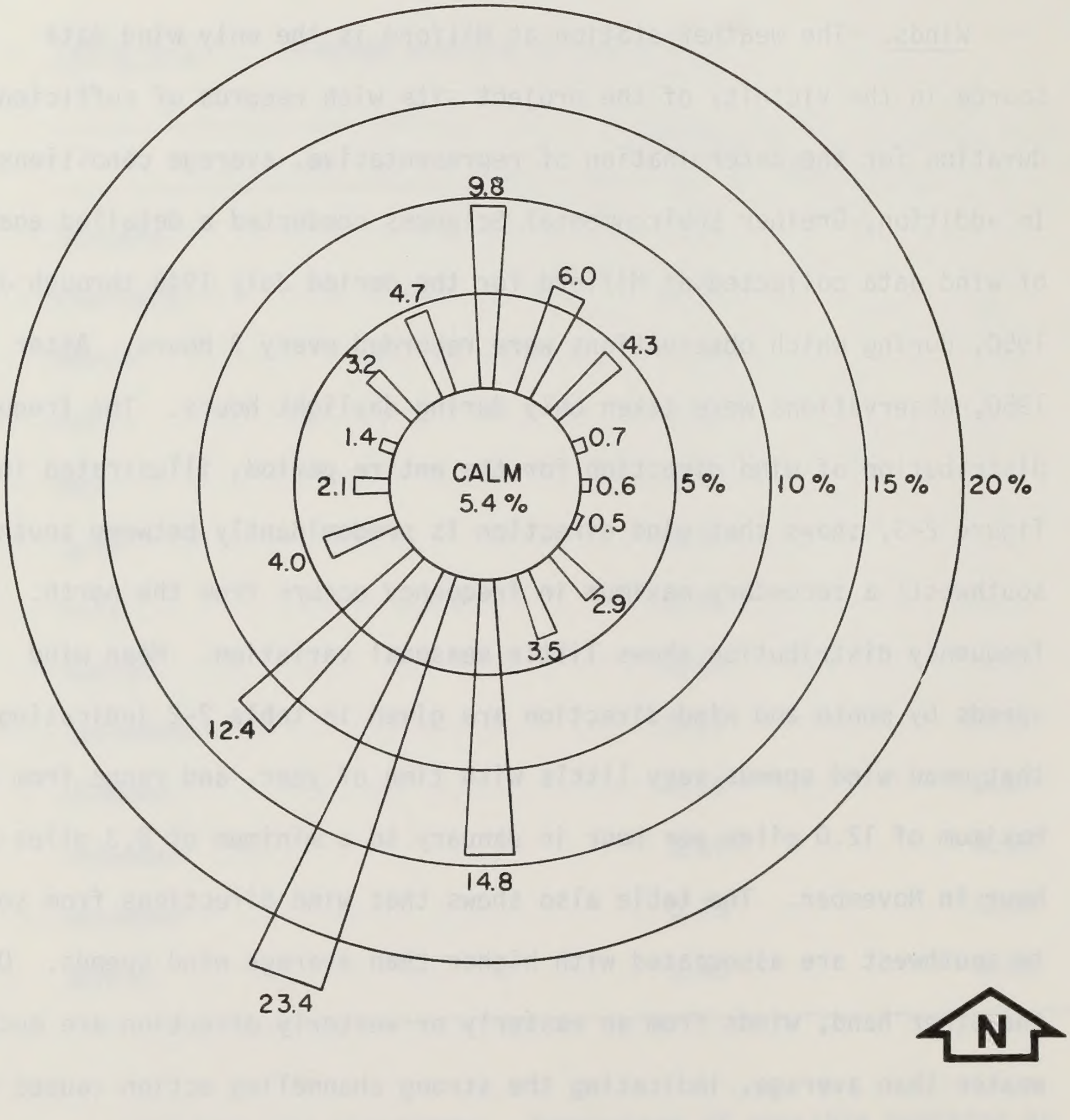


FIGURE 2-3

ANNUAL PERCENT FREQUENCY
OF SURFACE WIND DIRECTION
ALL STABILITY CLASSES
MILFORD, UTAH

Table 2-2. Mean wind speed by month and wind direction (Milford, Beaver County, Utah, July 23, 1948 to June 11, 1950)

Direction	Mean wind speed (miles per hour[a]) Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
NNE	12.6	11.8	10.4	12.3	11.0	11.9	8.6	9.5	9.5	11.6	11.5	9.7	11.3
NE	6.4	9.3	8.2	7.5	5.8	8.4	7.5	9.4	9.7	7.5	9.3	5.9	7.9
ENE	3.7	6.8	6.9	7.1	5.5	5.5	4.6	6.9	6.9	3.5	4.6	3.5	5.6
E	3.5	4.6	4.8	2.9	4.6	3.5	5.5	3.5	5.2	4.0	3.5	3.5	4.3
ESE	0.	4.0	6.3	3.7	8.8	3.5	9.0	3.5	2.3	3.2	2.3	0.	5.2
SE	5.6	8.5	6.0	5.2	5.9	7.4	6.2	9.3	6.1	5.8	5.8	4.6	6.4
SEE	8.9	7.3	5.9	6.0	9.5	7.8	8.5	9.0	10.5	7.4	7.0	7.7	8.1
S	12.5	8.9	8.9	12.7	9.1	14.5	11.6	9.6	9.8	7.4	7.1	9.1	9.9
SSW	16.0	13.9	13.3	14.3	14.0	15.2	13.6	12.8	14.7	11.4	10.9	12.8	13.6
SW	13.1	10.6	10.9	12.1	11.8	13.0	11.2	14.1	13.5	13.1	9.0	11.0	12.3
WSW	5.9	7.2	9.2	7.7	11.9	12.4	10.5	13.7	12.6	7.8	10.4	11.7	10.5
W	5.6	4.3	7.1	9.5	6.6	7.5	6.7	10.2	6.1	5.2	5.2	6.0	6.7
WNW	6.3	3.7	5.2	8.7	8.1	8.6	3.8	6.9	9.1	3.7	4.4	4.9	6.0
NW	6.5	5.3	7.6	8.8	7.3	6.4	8.9	3.5	7.5	6.1	6.3	8.1	7.3
NNW	12.8	7.8	9.2	10.0	9.4	10.3	1.2	11.0	12.0	11.2	9.9	9.3	10.4
N	12.0	10.0	10.7	11.5	10.6	11.2	11.5	8.5	10.9	9.7	8.4	10.6	10.5
BLM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
Average	12.0	9.4	9.5	10.3	9.5	11.2	10.8	11.6	11.0	9.1	8.3	9.7	10.2

[a] One mile = 0.868 knots

easterly quadrants were much less frequent. The orientation of the Wah Wah Valley, with the valley bottom sloping downward toward the north, is such that the diurnal mountain/valley circulation would cause drainage winds during night and early morning hours from the south and daytime flow moving upvalley from the north. This diurnal pattern occurs mainly when the overall weather circulation is such that only very light winds prevail and local conditions can predominate. At night, in the absence of significant cloud cover, the valley floor and mountain slopes cool more rapidly because of the loss of terrestrial radiation upwards. As the air immediately in contact with the ground cools and becomes more dense, gravity causes the air to flow down the mountain slope into the valley and out the valley floor. At night drainage flows in Wah Wah Valley should head out north toward Sevier Lake. During the daytime, when the mountain slopes absorb solar radiation, the air above them will warm faster than the free atmosphere, causing it to rise and be displaced by air above the valley floor. This will result in air moving up the valley sides and along the valley floor, creating a wind flow essentially the reverse of the one at night. Within Wah Wah Valley, air will flow from north to south and then spread out as it moves up the mountain slopes on either side of the valley bottom.

An examination of the hourly wind data collected at the Lower Station in the spring and summer failed to reveal evidence of a pattern as described above. The reason for this absence is not readily apparent. The Lower Station is located at the far south end of the Wah Wah Valley floor, and just toward the south the ground slopes downward again into the Escalante Desert Valley. Because of significant differences in surrounding topography between the alunite site and Milford, a strong correlation of wind speed and direction between the two locations would not be expected. Very dissimilar winds between the Milford Station and the Lower Station at the alunite site have been observed during periods of light wind speeds. The closest correlations would be expected to occur during periods of strong winds.

Dispersion potential. Dispersion potential is a measure of the degree of dilution one may expect of any potential release of contaminants into the free atmosphere. It is a function of wind speed, atmospheric stability, and mixing depth (depth of layer above the ground through which strong vertical mixing occurs). For the purpose of determining dispersion potential around the proposed project site, the joint frequency distribution of stability conditions and wind speeds for Milford was used. Stability was classified according to the Pasquill method based on the amount of solar radiation and wind speed at the surface. The categories range from A - most unstable, to F - most stable. Stability categories were obtained using Milford surface observations for the period from July 1948 through December 1951 according to criteria listed by Slade (1968). The frequency distribution by season (table 2-3), shows that the neutral or D stability category is most prevalent. Moderately stable or F categories are least common in summer and most common in the fall, when they occur more than one-fourth of the time. The joint wind speed-stability frequency distribution (table 2-4) indicates stable conditions are mainly associated with low wind speeds. Poor

Table 2-3. Percentage frequency of stability categories by season, Milford, Utah, July 1948 to December 1951

	Stability category					
	A Extremely unstable	B Moderately unstable	C Slightly unstable	D Neutral	E Slightly stable	F Moderately stable
Winter	0.2	3.5	7.0	53.2	13.0	23.1
Spring	1.9	7.0	13.5	41.4	11.4	24.7
Summer	2.5	5.3	19.4	36.8	16.5	19.5
Fall	0.3	5.4	10.9	39.4	15.8	28.3
Annual	1.1	5.2	12.2	43.3	14.1	24.1

Table 2-4. Relative frequency distribution of stability classes and wind speeds for Milford, Utah, July 1948 to December 1951

	(Wind speed, knots[a])						
Stability	0-3	4-6	7-10	11-16	17-21	Greater than 21	Total
Extremely unstable A	1.3	0.4	0.0	0.0	0.0	0.0	1.7
Moderately unstable B	3.5	1.6	1.4	0.0	0.0	0.0	6.5
Slightly unstable C	1.4	2.2	5.8	1.4	0.4	0.4	11.6
Neutral D	1.8	2.4	11.1	16.5	6.4	3.3	41.5
Slightly stable E	0.0	2.8	10.2	0.0	0.0	0.0	13.0
Moderately stable F	17.2	8.8	0.0	0.0	0.0	0.0	26.0

[a] One knot = 1.15 mph

dispersion conditions associated with a moderately stable category and wind speed below 6 knots are common 26.0 percent of the time. Excellent dispersion conditions with winds above 10 knots and slightly unstable to neutral stability occur 28.4 percent of the time.

Mixing depth becomes important in estimating dispersion on a regional scale. Mixing depth must be obtained through vertical temperature soundings not available in the general vicinity. The nearest weather station where routine soundings are taken is Ely, Nevada about 120 miles northwest of the proposed project site. Mean morning and afternoon mixing depths and mean wind speeds have been calculated on a seasonal basis for all localities in the United States where routine vertical soundings are available (Holzworth, 1972). For the proposed alunite project site estimates of the mixing depth can be made by interpolating between the values at Ely and Las Vegas, Nevada, Salt Lake City, Utah and Grand Junction, Colorado. Mean maximum mixing depths and wind speeds as estimated by interpolation are listed in table 2-5, indicating that worst average dispersion conditions exist in January while best average conditions occur in July. Mixing depth varies greatly with time of day. At night when the air becomes stable, mixing is restricted to a thin layer close to the ground where mechanical turbulence occurs. During the day when surface temperature rises, a well-mixed layer forms which increases in depth, usually until the afternoon maximum temperature is reached.

The frequency of stagnation episodes has been defined for all regions of the United States. In southwestern Utah there is an annual average of 5 stagnation episodes or 25 episode-days. Stagnation episodes are defined as periods of continuous wind speeds equal to or less than 4 meters per second and mixing heights of 500 meters or less for a duration of 2 days or more.

Table 2-5. Mean mixing depths and wind speeds for proposed project site

	Mean mixing depth, meters		Mean wind speed, meters/second	
	morning	afternoon	morning	afternoon
Winter	200	1100	4.5	5.0
Spring	400	2800	5.0	7.0
Summer	200	3800	4.0	6.5
Fall	200	2200	4.0	5.5

AIR QUALITY

Regional setting and project site. The geographic area of concern described in figure 2-1 is included in the Utah Intrastate Air Quality Control Region (AQCR), designated by the Environmental Protection Agency (EPA) as a Priority III Region for all pollutants, which indicates maximum pollution levels below federal primary and secondary standards. The Utah Intrastate AQCR covers a 16-county region in west-central and northeastern Utah. The State of Utah maintains no air quality monitoring stations in this region. The Priority III classification, which indicates minimal pollution levels, is based on estimates of air quality.

Estimated emissions of particulates in Beaver County for 1972 totaled 510 tons per year (State of Utah, Department of Social Services, April 1974). Total sulfur dioxide emissions were estimated at 220 tons per year with 59.1 percent coming from vehicular sources. Hydrocarbons amounted to 1,400 tons per year, 62.8 percent of which were attributed to transportation. Vehicular sources were also responsible for most of the emissions of carbon monoxide and nitrogen oxides.

To obtain background pollution levels for the proposed project site, Greiner Environmental Sciences established pollution monitoring equipment at the two temporary weather stations. Pollution monitoring was conducted for a 6-month period from April through September 1975. The Upper Station monitored total suspended particulates and sulfur dioxide. The Lower Station measured particulates, sulfur dioxide, and nitrogen oxides. These observations, together with the relevant Federal Ambient Air Quality Primary and Secondary Standards are summarized in tables 2-6, 2-7, and 2-8. There is a possibility that pollution levels observed might be slightly high because the propane-fired generators used to supply power to the stations may have contaminated some of the samples. High levels of particulates occur at times. During the 6-month period, a maximum 24-hourly particulate concentration of 170 micrograms per cubic meter ($\mu g/m^3$) was observed at the lower station. This high reading is the result of strong winds raising dust from the desert surface into the atmosphere. The federal ambient secondary standard is violated if a 24-hour value greater than 150 $\mu g/m^3$ occurs more than once a year.

Table 2-6. Summary of sulfur dioxide monitoring, proposed Alunite site, April-September 1975

	(units in parts per million)		
	6 mo. avg.	Max. 24-hr. avg.	Max.3-hr. avg.
Upper Station	--	0.014	0.016
Lower Station	0.004	0.012	0.012
Federal Primary Standards	0.030 (annual)	0.140	--
Federal Secondary Standards	--	--	0.50

Table 2-7. Summary of nitrogen oxide monitoring, proposed Alunite site, April-September 1975

	(units in parts per million)		
	6 mo. avg.	Max. 24-hr. avg.	Max. 3-hr. avg.
Lower Station	0.006	0.020	0.029
Federal Primary Standards	0.050 (annual)	--	--
Federal Secondary Standards	0.050 (annual)	--	--

Table 2-8. Summary of particulate monitoring, proposed Alunite site, April-September 1975

	(units in micrograms per cubic meter)	
	6 mo. avg.	Max. 24-hr. avg.
Upper Station	16.0	100.4
Lower Station	13.4	170.6
Federal Primary Standards	75[a]	260[b]
Federal Secondary Standards	60[a]	150[b]

---

[a] Annual geometric mean.

[b] Not to be exceeded more than once a year.

It is apparent that background air quality levels at the proposed alunite site for sulfur dioxide and nitrogen oxides well below the federal standards.

The proposed alunite project would be located in a region that has been designated as Class II under the EPA Prevention of Significant Air Quality Deterioration Regulations (see table 2-9). The designations are based on existing air quality levels, as well as economic, social, and other environmental factors, and establish limits as to the amount of deterioration of air quality allowed. At present, the only limits established relate to the maximum allowable incremental increases in total suspended particulates and sulfur dioxide. The Utah Air Conservation Committee has submitted a proposal to reclassify certain areas of Utah, including the region around the proposed alunite project, from Class II to Class III designations.

Table 2-9. Area designations and allowable increases in pollutant concentrations over the baseline air quality concentration as described in the Significant Deterioration Regulations (EPA Air Quality Implementation Plans, Prevention of significant air quality deterioration. Federal Register Vol. 38, No. 235, Thursday, December 5, 1974)

Pollutant	Class I[a] ($\mu g/m^3$)	Class II[a] ($\mu g/m^3$)	Class III ($\mu g/m^3$)
Particulate matter:			
Annual geometric mean	5	10	a
24-hour maximum	10	30	a
Sulfur dioxide:			
Annual arithmetic mean	2	15	a
24-hour maximum	5	100	a
3-hour maximum	25	700	a

[a] Class I applies to areas in which practically any change in air quality would be considered significant.

Class II applies to areas in which deterioration normally accompanying moderate, well-controlled growth would be considered insignificant. All values are allowable increases in pollutant concentrations over the baseline air quality concentration.

Areas designated as Class III shall be limited to concentrations of particulate matter and sulfur dioxide no greater than national ambient air quality standards.

TOPOGRAPHY

Regional setting. The topographic area of concern is shown in figure 2-4. Topography is a factor that must be considered when evaluating potential impacts to air quality and visual aesthetics. The area outlined includes the areas of concern identified for these two resources.

The topography of this region is characterized by a series of mountain ranges running in a north/south direction, interrupted by broad valleys (see fig. 2-4). The mountain ranges generally have a maximum elevation up to 8,000 or 9,000 feet, while the valley floors generally lie at about 5,000 feet. Wah Wah Valley is a typical broad valley that slopes gently to the north toward the dry Sevier Lake bed (see fig. 2-1). A group of low hills at the south end of the valley forms a low divide with the Escalante Valley. The Wah Wah Mountains consist of steep and rugged highlands separated by canyons and drainages. Alluvial fans are forming at the mouths of these drainages.

Project site. Figure 2-4 shows the location of major components of the proposed alunite development in relation to topographic features. The proposed alunite mine (fig. 2-5) would be located on one of the smaller peaks at the south end of the Wah Wah Mountains. The processing plant site would be located at the base of the Wah Wah Mountains on gently-sloping alluvial fans (fig. 2-6). The water well field, railroad spur, and highway would be located on the valley floor (fig. 2-7).

GEOLOGY

Regional setting. The geographic area of concern is shown on figure 2-8. This area includes the proposed alunite mine and all of the preference right lease applications made by Alumet.

The mountainous portion of the area consists primarily of sedimentary rocks overlain by volcanic rocks. The valley fill is composed of old lakebed deposits and eroded material from the surrounding mountains. Figure 2-8 shows the generalized geology of the region. Fault lines are also shown in figure 2-8; however, no earthquake activity has been recorded in this region.

Mineral deposits that have been identified in the region are shown in figure 2-9. Most of this mineralization appears to have resulted from alteration of the volcanic rocks by hot acid waters. Alunite, silicia (opal-quartz), kaolinite, chlorite, pyrite, and hematite resulted from this alteration process. Other minerals that have been identified in this area are fluorspar and uranium. In addition to the deposits shown in figure 2-9 the area contains extensive deposits of gravel and other common mineral materials suitable for construction purposes. The present level of mining claim activity is not known, but field observations by BLM personnel indicate it is very low.

Project site. The major components of the proposed alunite project are shown in figure 2-2. The alunite ore would be mined from area C. Other areas of alunite mineralization are included in the preference right lease application, but an analysis of the environmental effects of

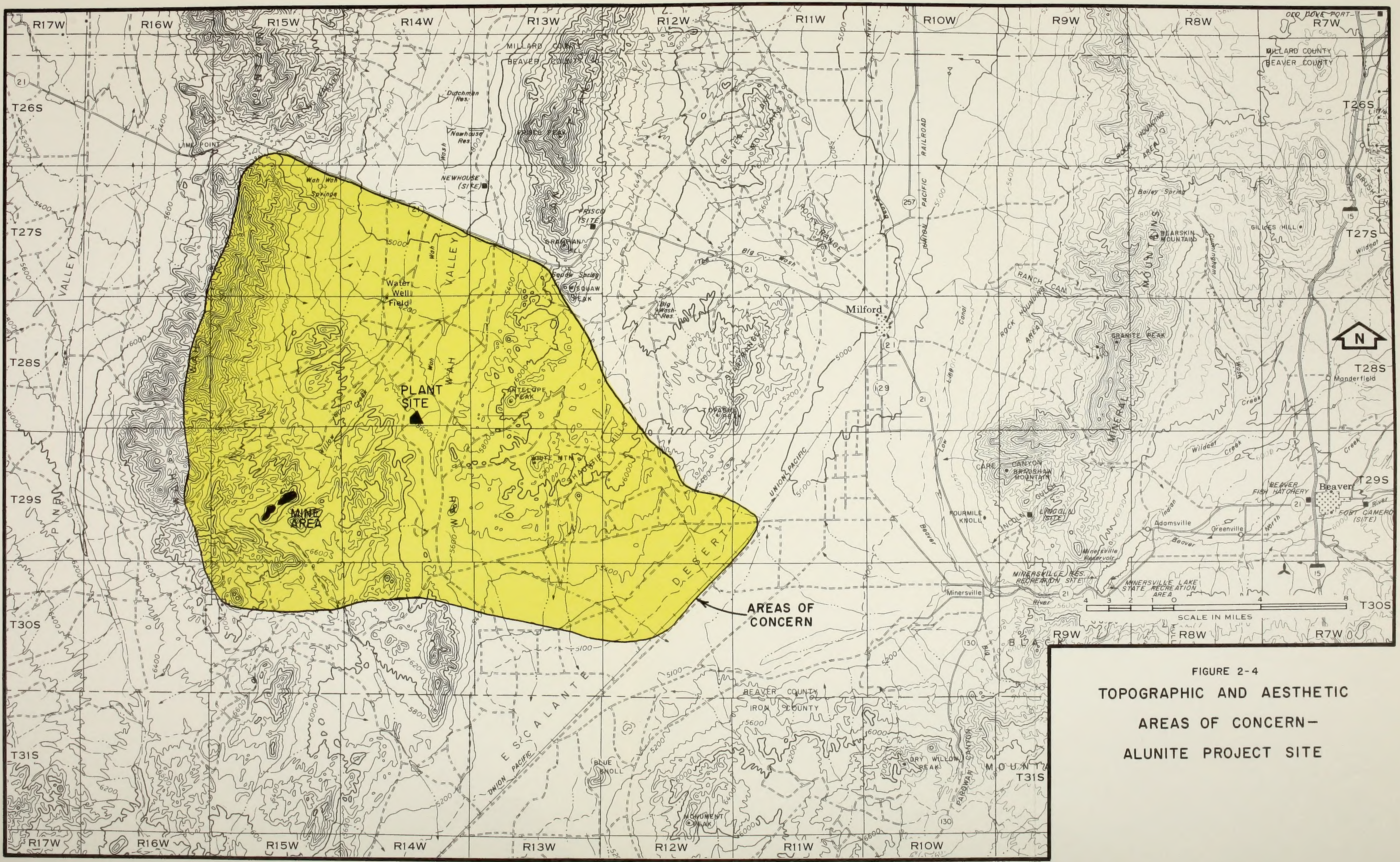


FIGURE 2-4

TOPOGRAPHIC AND AESTHETIC AREAS OF CONCERN—ALUNITE PROJECT SITE

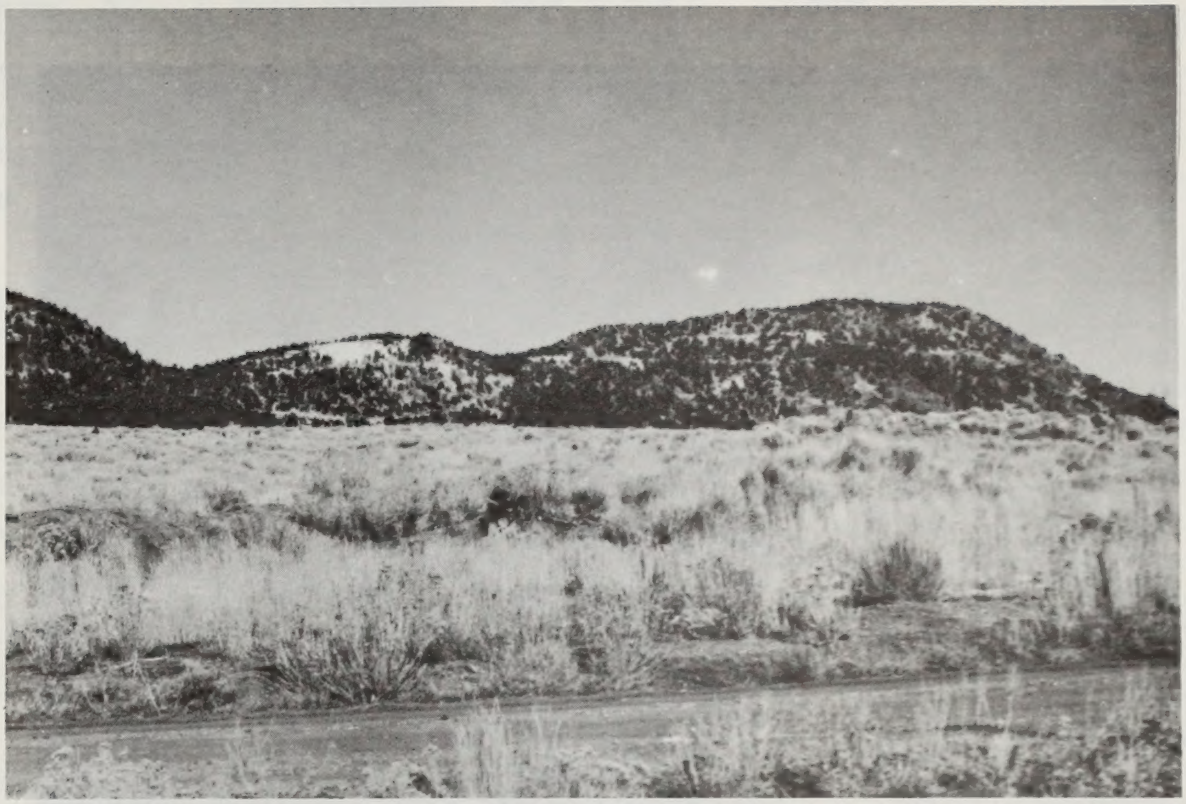


Figure 2-5
PROPOSED ALUNITE MINE AREA

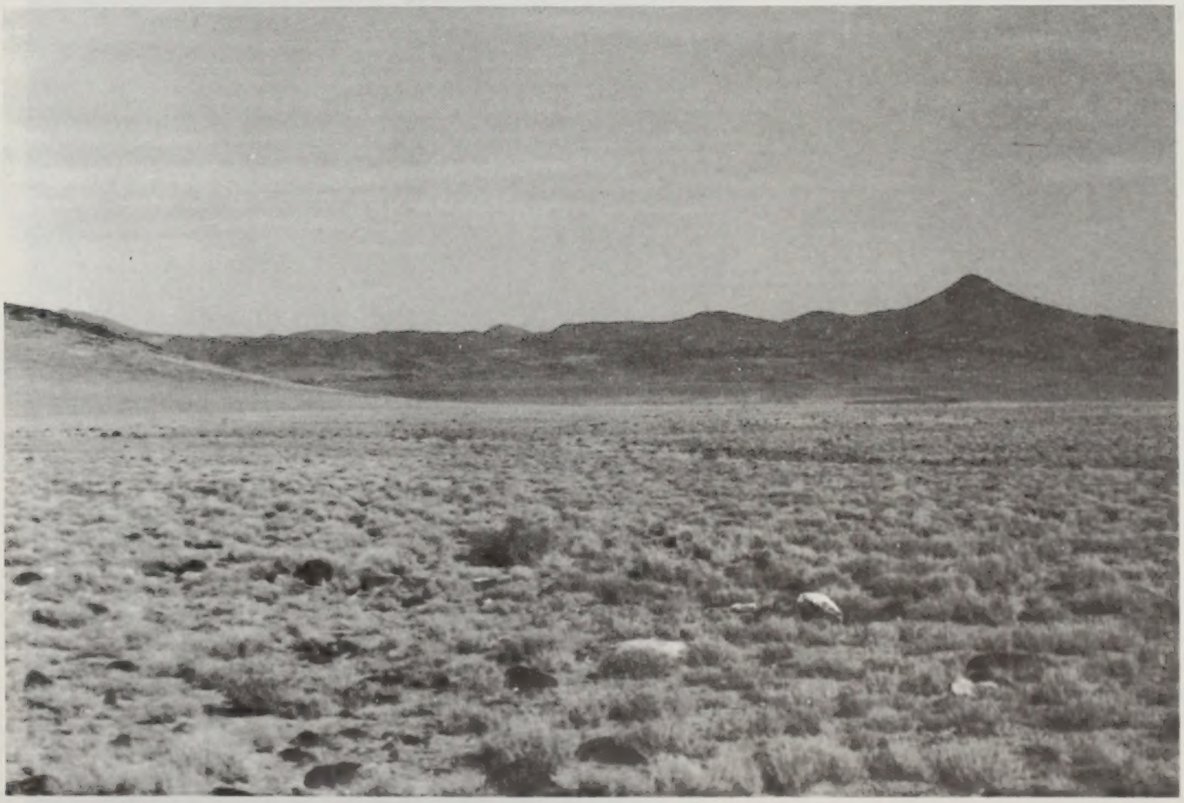


Figure 2-6
PROPOSED PROCESSING PLANT SITE

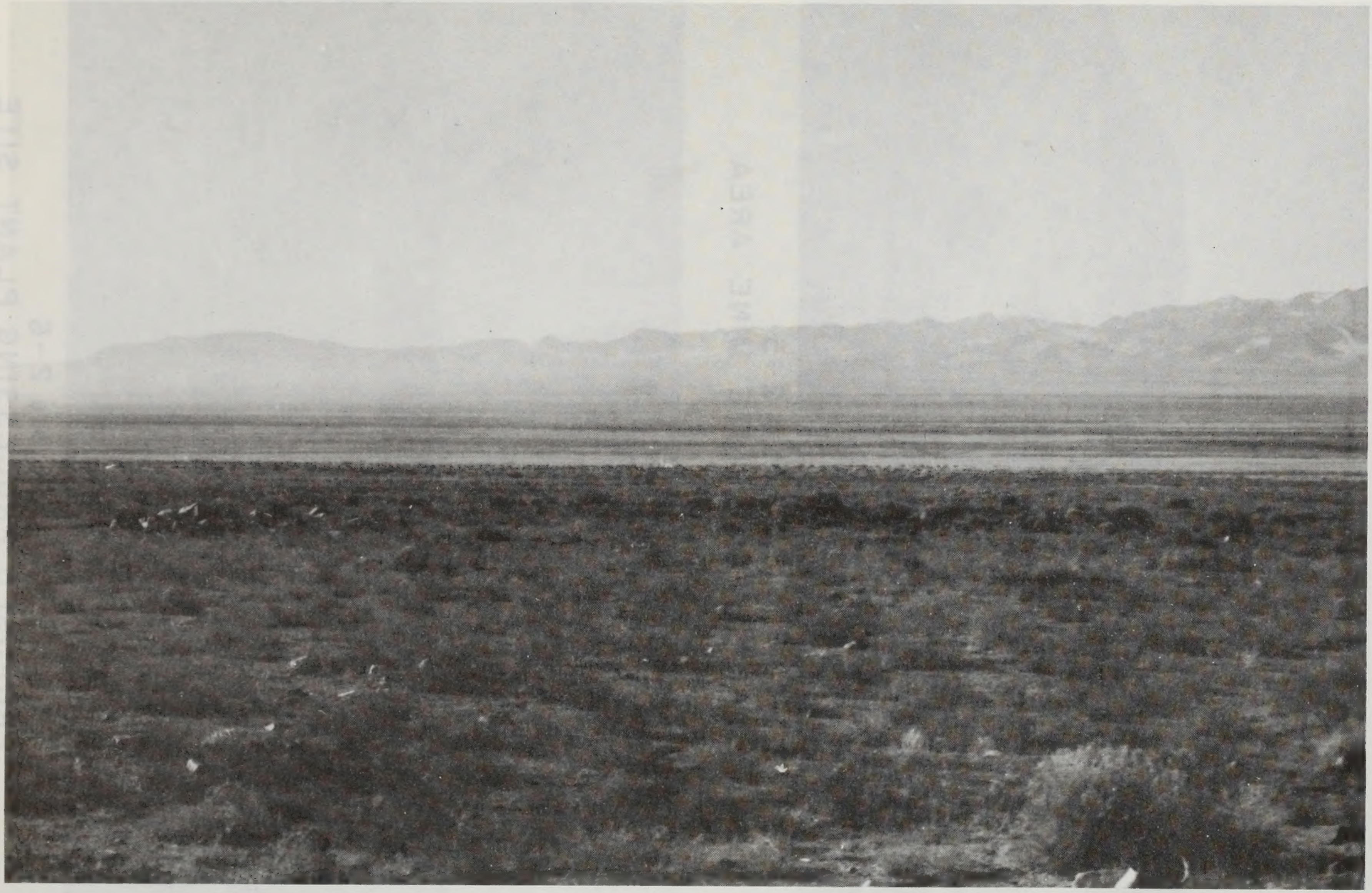


Figure 2-7
WAH WAH VALLEY

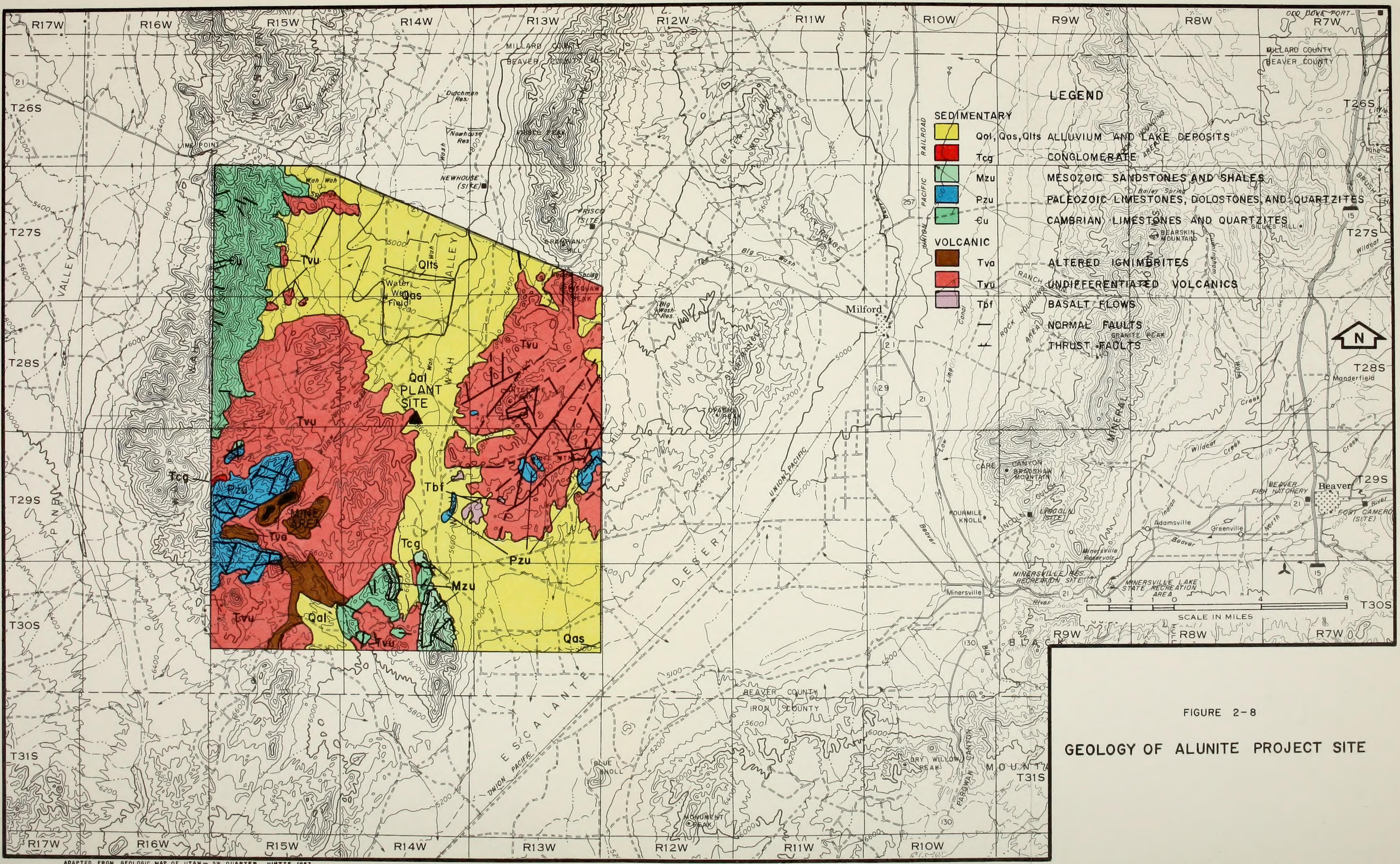


FIGURE 2-8

GEOLOGY OF ALUNITE PROJECT SITE

ADAPTED FROM GEOLOGIC MAP OF UTAH— SW QUARTER, HINTZE, 1963

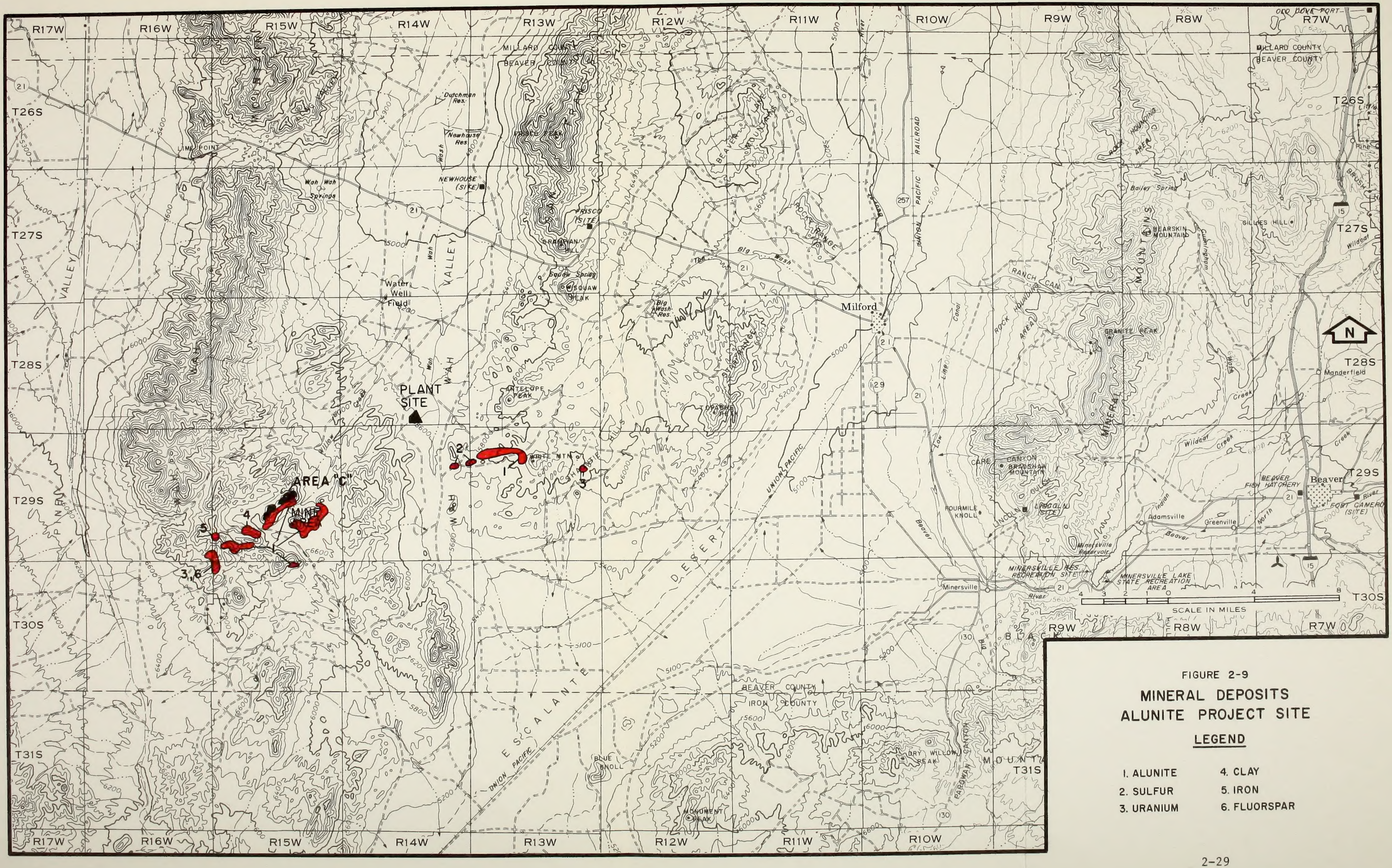


FIGURE 2-9

MINERAL DEPOSITS
ALUNITE PROJECT SITE

LEGEND

1. ALUNITE	4. CLAY
2. SULFUR	5. IRON
3. URANIUM	6. FLUORSPAR

mining these deposits would not be initiated until actual mining proposals are submitted.

The alluvial fans at the base of the Wah Wah Mountains would be the site for the processing plant complex and tailings ponds. The major access highway, railroad spur, and water well field would be located on the floor of the Wah Wah Valley. Water wells drilled in the area indicate that the valley fill is at least 1,000 feet deep.

HYDROLOGY

Regional setting. The geographic area of concern is shown on figure 2-10. This area includes the Beaver River drainage basin surrounding Milford and the Wah Wah Valley drainage basin. Ground water in the Milford area would be the source of the additional culinary water necessary to meet the increased demands resulting from an anticipated population increase. The Wah Wah Valley ground water reservoir would be the source of water for the proposed project.

Wah Wah Valley and the Milford area are located in a semiarid part of the Great Basin. The quantity of water available from precipitation is small and the evaporation rate is extremely high. All of the streams that originate in the two areas are intermittent or ephemeral. Although there is ground water stored in the unconsolidated and partly consolidated rocks that underlie the two areas, the quantity of water available from this storage on a sustained basis is limited by annual rates of natural recharge.

Figure 2-10 shows the locations of data sources. Selected hydrologic estimates for the two areas are given in table 2-10. Stephens (1974) reported on the hydrology of Wah Wah Valley and Mower and Cordova (1974) studied the hydrology of the Milford area.

Ground water - Wah Wah Valley

Water quantity. Most of the rocks underlying the Wah Wah Valley drainage basin contain ground water. The mountains on each side of Wah Wah Valley contain a complex system of aquifers in sedimentary, metasedimentary, and igneous rocks. These aquifers transmit water slowly except along zones of fracturing and solution cavities. Water discharging from these aquifers provides flow for some of the larger intermittent streams and supports the flow of a number of small mountain springs. Most of the mountain springs have maximum discharges of less than 20 gallons per minute. The Wah Wah Springs are the largest in the area with a total flow exceeding 400 gallons per minute or 0.891 cubic feet per second (Stephens, 1974). Total flow from this spring is reported by the owner to be as high as 3 cubic feet per second.

The valley ground water reservoir contains moderately to highly permeable aquifers in unconsolidated and partly consolidated deposits of gravel and sand, and is capable of yielding more than a thousand gallons per minute of water to large-diameter wells. Depths to the principal aquifers and potemtiometric surface (level to which water will rise in wells that tap the aquifers) range from several hundred to more than a thousand feet below the land surface. The applicant's 1,475-foot deep, 16-inch diameter Wah Wah number 1 well (in the area of

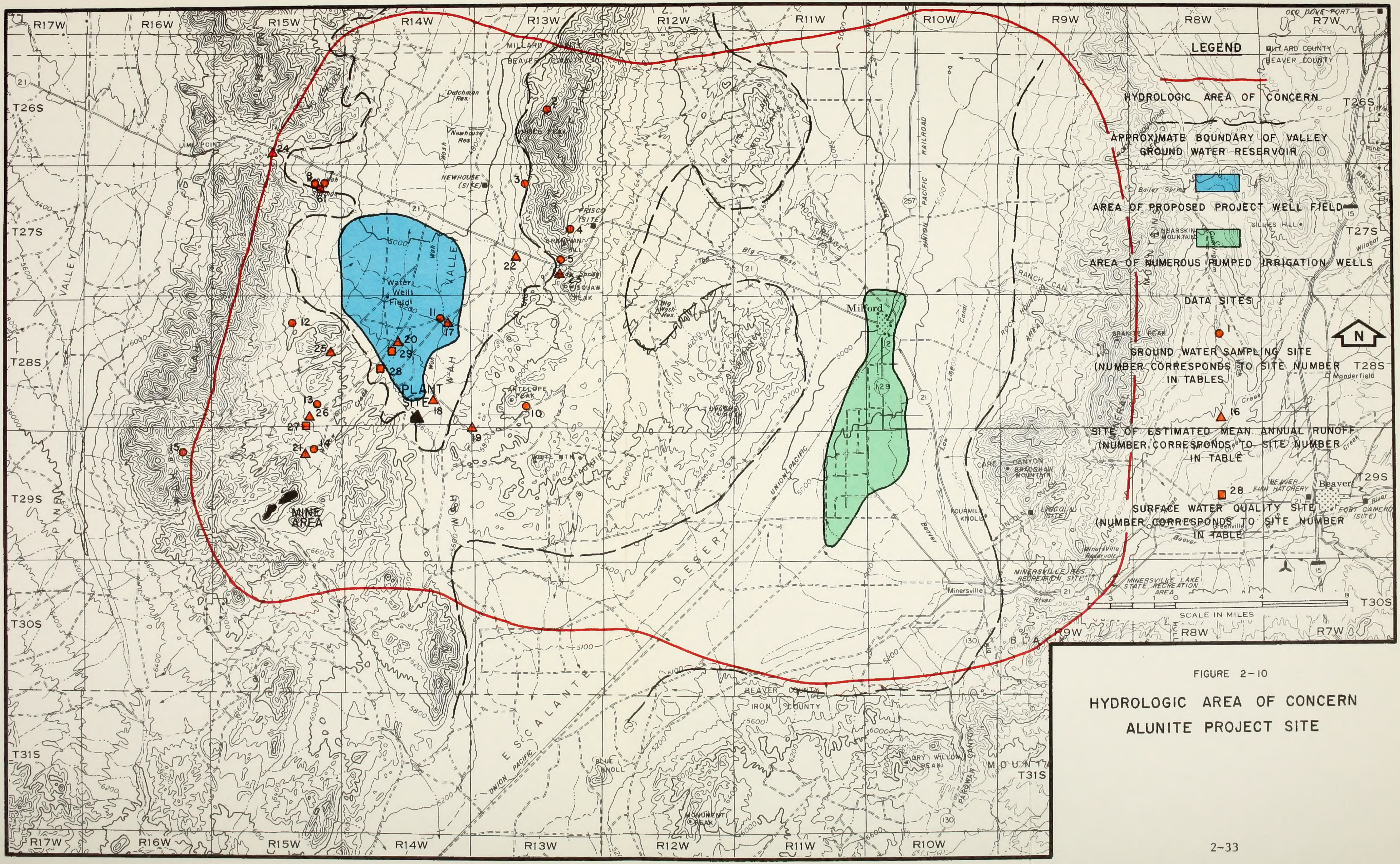


FIGURE 2-10

HYDROLOGIC AREA OF CONCERN ALUNITE PROJECT SITE

Table 2-10. Summary of quantitative hydrologic estimates for the Wah Wah Valley drainage basin and the Milford area (Data from Stephens - 1974, Mower and Cordova - 1974, and Eychaner et al. - 1975.)

Hydrologic parameter	Wah Wah Valley drainage basin	Milford area
	(thousand acre-feet)	
Average annual precipitation on area[a]	290.0	630.0
Average annual surface water imports	0.0	[b]27.6
Average annual runoff from uplands	7.8	24.0
Recoverable ground water in storage[c]	1,000.0	2,000.0
Annual ground water recharge	[d]10.0	[e]58.0
Annual ground water discharge	[f]10.0	[e]81.0
Annual ground water withdrawal by wells for use in 1974	negligible	70.2

[a] Based on 1931-60 normal annual precipitation; in both areas more than 90 percent is consumed by evapotranspiration at or near the place of fall.

[b] Beaver River water imported from Minersville Reservoir.

[c] Not previously published; estimated herein for the upper 100 feet of saturated valley fill deposits only.

[d] Average annual; includes 3,000 acre-feet per year of subsurface inflow from Pine Valley.

[e] Estimated for the 1970-71 year.

[f] Includes an estimated 8,500 acre-feet per year subsurface outflow to the north.

the proposed project well field) reportedly pumped about 1,700 gpm with 150 feet of drawdown. Static water level in the well was reported to be 670 feet.

Exact determinations have not been made of the total volume of potentially recoverable water in the Wah Wah Valley ground water reservoir. The surface area of the reservoir is estimated to be 100,000 acres. Assuming the reservoir to have an average effective porosity of at least 10 percent, dewatering only the upper 100 feet of the reservoir by pumping from wells would yield at least 1 million acre-feet of water.

Stephens (1974) estimates that the average annual recharge to the ground water system in the Wah Wah Valley drainage basin is about 10,000 acre-feet. Approximately 8,500 acre-feet of this recharge enters the valley ground water reservoir. Stephens (1974) feels that the natural discharge from the ground water reservoir is chiefly by subsurface outflow to the north or northwest. Normally, ground water recharge and discharge are equal over the long term; therefore, the annual rate of subsurface outflow is assumed to be on the order of 8,500 acre-feet per year. The ultimate disposition of this outflow has not been determined. It is probable that most of this water eventually moves toward the land surface in areas north of Wah Wah Valley and is utilized by greasewood, saltgrass, and other phreatophytes. Some of the water may enter ground water flow systems in bedrock and travel many miles to points of natural discharge north of Wah Wah Valley.

Water quality. Chemical analyses of ground water from selected sources in the Wah Wah Valley drainage basin have been compiled by the

U.S. Geological Survey (Stevens, 1974). Most of the ground water ranges from fresh to slightly saline.

Quality standards for potable water used by public carriers and others subject to federal quarantine regulations were established by the U.S. Public Health Service in 1962. These standards define maximum levels of bacteria, radioactivity, and chemical constituents which may be present in a culinary water supply. According to these standards, most of the ground water sampled in the Wah Wah Valley drainage basin is suitable for human consumption. However, some of the samples contained larger concentrations of total dissolved solids than the maximum allowable limit recommended by the U.S. Public Health Service, and several samples contained larger concentrations of sulfate and chloride than the recommended maximum allowable limit.

Most livestock and wildlife can tolerate water containing several thousand milligrams per liter of dissolved solids. Based on the water quality analyses, the ground water sampled is chemically suitable for consumption by livestock and wildlife.

According to the classification system developed by the U.S. Salinity Laboratory Staff (1954) most of the ground waters sampled have a low sodium hazard and a medium-to-high salinity hazard and would be suitable for irrigation provided soil and drainage conditions were compatible. This water is also chemically suitable for most industrial uses.

Water use. There has been very little development of the ground water resources in the Wah Wah Valley drainage basin. The water from the Wah Wah Springs area is used for irrigation, domestic uses, and livestock at the Wah Wah Ranch. Water from several widely scattered wells, mine workings, and springs is used by livestock and wildlife. Prior to the applicant's test well drilling program which began in 1973, only three or four small stock water supply wells had tapped the ground water reservoir. Only one of these wells is now being used, producing less than 2 acre-feet of water per year.

The Wah Wah Valley drainage basin is in an area where the Utah State Engineer has placed no restriction on applications to appropriate additional ground water.

Ground water - Milford area

Water quantity. The principal source of ground water in the Milford area is the valley ground water reservoir in the northern portion of Escalante Valley. This reservoir contains moderately to highly permeable aquifers in sand and gravel deposits. Yields to individual wells tapping these aquifers range from several hundred to more than 2,000 gallons per minute. Depth to the ground water generally is less than 100 feet, but in some areas it ranges from 100 to more than 300 feet. Much of the ground water is confined and some wells in the area flow as a result of the artesian pressure.

An exact determination has not been made of the total volume of ground water available from storage in the Milford area. Mower and Cordova (1974) estimate that lowering of the ground water levels 1 foot throughout the area would result in a change of ground water storage of about 84,000 acre-feet.

Annual recharge to the valley ground water reservoir in the Milford area is estimated to have been about 58,000 acre-feet during the 1970-71 period. Discharge from the reservoir for this same period is estimated to have been about 81,000 acre-feet (Mower and Cordova, 1974), representing a decrease in reservoir storage of 23,000 acre-feet.

Water quality. Most of the water in the valley ground water reservoir ranges from fresh to slightly saline (Mower and Cordova, 1974). The water from most wells has a low sodium hazard and a medium-to-high salinity hazard with respect to irrigation use. The water is presently being used successfully for irrigation and culinary purposes. However, there is no assurance that additional water developments for municipal supply and some industrial uses would not require some special treatment to meet the necessary quality requirements.

Water use. The principal use of ground water in the Milford area is for irrigation. During 1974, an estimated 70,200 acre-feet of water were withdrawn from wells in the area, of which approximately 69,100 acre-feet were used for irrigation, 700 acre-feet for public supply, 300 acre-feet for industry and 100 acre-feet for domestic and stock supply (Eychaner et al., 1975). Over the years, the large withdrawals of water from the valley ground water reservoir in the Milford area have resulted in ground water level declines of as much as 30 feet in some areas. Dewatering of aquifers has resulted in some local land subsidence south of Milford (Cordova and Mower, 1976). The intense development of the ground water reservoir has also caused significant local changes in the quality of ground water. Return to the ground water reservoir, by deep infiltration, of water pumped and used for irrigation, and encroachment of saline ground water from outside the pumped area has increased the mineral content of the locally-stored water (Mower and Cordova, 1974).

Because of the overdevelopment of the valley ground water reservoir in the Milford area, as reflected in the above-mentioned imbalance between ground water recharge and discharge, the Utah State Engineer has declared the area a "critical ground water area." Consequently, permits are no longer issued to appropriate additional ground water in the area. Additional water for municipal growth and other purposes would have to be obtained by the purchase of existing water rights.

Surface water - Wah Wah Valley. Total annual runoff in the Wah Wah Valley drainage basin is estimated to average about 7,800 acre-feet a year (Stephens, 1974). Some of the runoff sinks into the ground and becomes a source of ground water recharge; the rest is consumed by evapotranspiration. None of the water leaves the basin as overland runoff.

Although some of the ephemeral streams carry large flood flows during periods of cloudburst storm activity, total annual discharge from those streams is small. Table 2-11 shows the estimated mean annual runoff from several of the intermittent and ephemeral streams in the southern part of Wah Wah Valley. Seepage from the larger streams as they flow across permeable alluvial fans is an important source of recharge to the valley ground water reservoir (Stephens, 1974).

Table 2-11. Estimated mean annual runoff from selected streams in southern Wah Wah Valley (after Stephens, 1974)

Site number (see fig. 2-10)	Altitude (feet)	Drainage area (square miles)	Mean annual runoff (acre-feet)
		Wah Wah Wash	
16	4,930	121.0	100
17	5,170	57.2	520
18	5,400	36.0	580
		Grover Wash	
19	5,690	11.4	620
		Willow Creek	
20	5,380	30.1	440
21	6,140	14.8	1,890
		Frisco Wash	
22	5,540	6.4	790
23	5,950	4.8	1,430
		Unnamed tributaries	
24	5,980	2.6	240
25	5,680	9.6	460
		Quartz Creek	
26	6,060	6.4	250

Few records are available concerning the chemical quality of surface water in the Wah Wah Valley drainage basin. Stephens (1974) made several field measurements of the specific conductance of the flow in Quartz and Willow creeks from which he estimated the dissolved solids content of the water as shown in table 2-12.

Table 2-12. Discharge and estimated dissolved solids concentration of Quartz and Willow creeks, June 21, 1973

Sample site (see figure 2-10)	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25°C)	Estimated dissolved solids (milligrams per liter)
		Quartz Creek	
27	0.29	2,000	1,200
		Willow Creek	
21	2.05	770	460
28	1.26	1,000	600
29	[a]	1,000	600

[a] Sample collected near point where stream flow was completely depleted by seepage into the streambed and by evaporation.

With the exception of spring flow, there has been little development of surface water in Wah Wah Valley. The principal use of the overland runoff is for watering of livestock and wildlife. There are no known applications to appropriate this intermittent and ephemeral flow for other uses.

Surface water - Milford area. The Beaver River is the only dependable source of surface water for the Milford area. Flow of the river is stored in the Minersville Reservoir (about 15 miles southeast of Milford), and from there is diverted by canals to the area between Milford and Minersville for irrigation. Average annual diversions from the Minersville Reservoir to the Milford-Minersville area from 1914 to 1971 were 27,600 acre-feet (Mower and Cordova, 1974). Although the natural channel of the Beaver River extends northward through the Milford area, there has seldom been stream flow in the channel north of Milford since 1914 when the Minersville Reservoir first started to fill.

All of the streams that originate in the mountains adjacent to the Milford area are small and intermittent or ephemeral. However, they are subject to flooding during periods of cloudburst activity. Mower and Cordova (1974) estimate that the total mean annual runoff from these streams is about 24,000 acre-feet. They note that the flows of these streams rarely reach the lowlands and that negligible amounts of water leave the Milford area by the Beaver River channel.

Water stored in Minersville Reservoir, and eventually diverted to the Milford area, is suitable for irrigation. There are no data available to evaluate the chemical quality of water in the intermittent and ephemeral streams in the Milford area.

As noted earlier, Beaver River water is used almost exclusively for irrigation in the Milford area. Prior to 1918, the river was the only source of irrigation water in this area, but since 1918, pumped wells have provided a progressively larger portion of the irrigation supply (Mower and Cordova, 1974).

Project site. The hydrologic setting described for the Wah Wah Valley drainage basin summarizes the available information for the project site. Ground water pumped from the proposed well field shown in figure 2-10 would be used for the processing plant. Two small wells located near the proposed alunite mine would supply water for mining operations.

No surface water would be used in the proposed action. However, Willow Creek, which generally runs water during the spring and early summer, is located just north of the proposed alunite mine (see fig. 2-10). The tailings ponds would be located at the mouths of several small drainages which have intermittent flow patterns.

SOILS

Regional setting. The geographic area of concern for soils encompasses the area that could be directly influenced by construction and/or operation of the proposed alunite project. The regional soils map (fig. 2-11) is based on maps and data from the Beaver River Basin Survey (Natural Resources Inventory, Beaver River Basin, Appendix I, 1972). The area of concern contains the six soil associations described below (see appendix A for complete descriptions), which are numbered as they appear in the above-cited report.

Soil association 97 contains desert loams and gravelly loams. The loams are fairly coarse-textured, deep soils with a strong hardpan at 12 to 17 inches. They generally occur on alluvial fans.

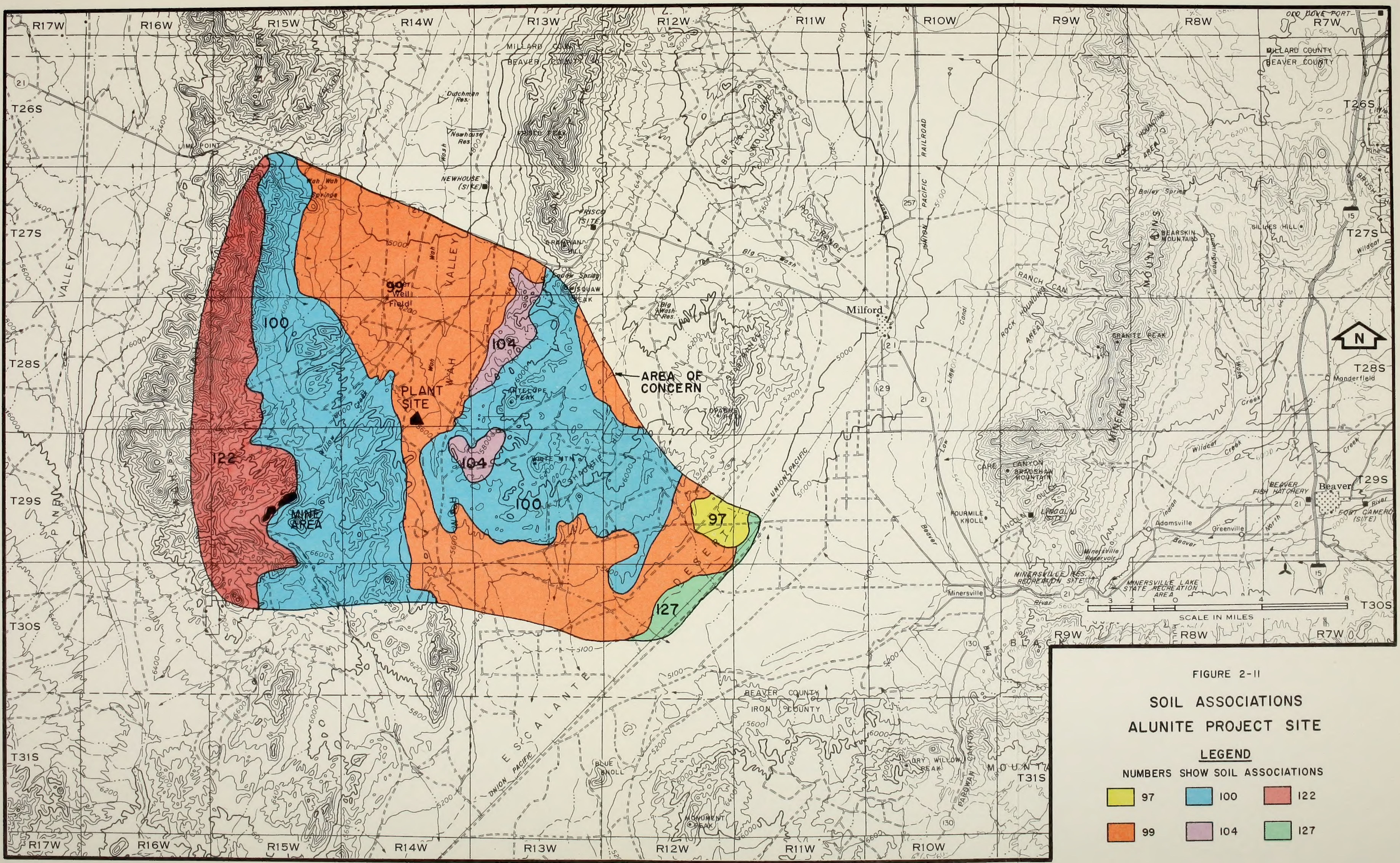


FIGURE 2-11

SOIL ASSOCIATIONS
ALUNITE PROJECT SITE

LEGEND

NUMBERS SHOW SOIL ASSOCIATIONS

🟨 97	🟦 100	🟥 122
🟧 99	🟪 104	🟩 127

Soil association 99 includes desert gravelly loams very similar to association 97. The major difference is the lack of a well-developed hardpan layer in this association.

Soil association 100 is composed of fairly deep to deep, semidesert loam soils occurring on rolling hills and mountain slopes. These are well-drained soils with a hardpan at 18 to 24 inches.

Soil association 104 is composed of shallow to moderately deep desert loam soils occurring on valley benches and the steeper slopes of low mountains.

Soil association 122 includes very shallow to deep loam soils formed from bedrock. These are medium-textured fertile soils with a distinct hardpan 8 to 24 inches below the surface. They occur in the pinyon-juniper vegetation community on the hills and mountain slopes.

Soil classification 127 occurs on desert flats. These are deep, fine-textured, fairly well drained to poorly drained soils and may be either strongly alkaline or saline in nature.

Soil erosion data were obtained from the Beaver River Basin Study (Natural Resources Inventory, Beaver River Basin Appendix III, 1973). The Basin was mapped and erosion was classified according to the erosion potential rates. This study showed that erosion potential varied from Moderate to Not Apparent in the regional area of concern.

Project site. The erosion potential for the soils that would be affected by the proposed project vary from Moderate to Not Apparent. The vegetative recovery potential, which is based on physical properties of the soil, depth of the soil, and precipitation, varies from None to Low.

VEGETATION

Regional setting. The geographic area of concern encompasses the area in which vegetation could be directly influenced by construction and/or operation of the proposed alunite project (figure 2-12). The area of concern for vegetation and soils is identical because of the interrelationship of these two resources.

Vegetative species and yearly plant production are closely associated with the amount of precipitation received which, in turn, is closely related to elevation. The major factor influencing the relationship of plants to the amount of precipitation is the depth and fertility of soil. The entire area is semiarid (low precipitation-high evapotranspiration level).

Species list. Species known to occur in the area are listed in appendix B.

The vegetation of the area has been classified into four major vegetative communities (see fig. 2-12).

Mixed shrub-grass community. This community (fig. 2-13) is confined to the benchland and foothills and consists of the following seven shrub species: big sagebrush, black sagebrush, big rabbitbrush, small rabbitbrush, greasewood, winterfat, and matchweed. The most abundant grass species are galleta, Indian ricegrass, and cheatgrass.

The mixed shrub-grass community contains the browse plants preferred by domestic livestock and was the vegetative community most severely abused by early sheep grazing. Since the perennial plants remained

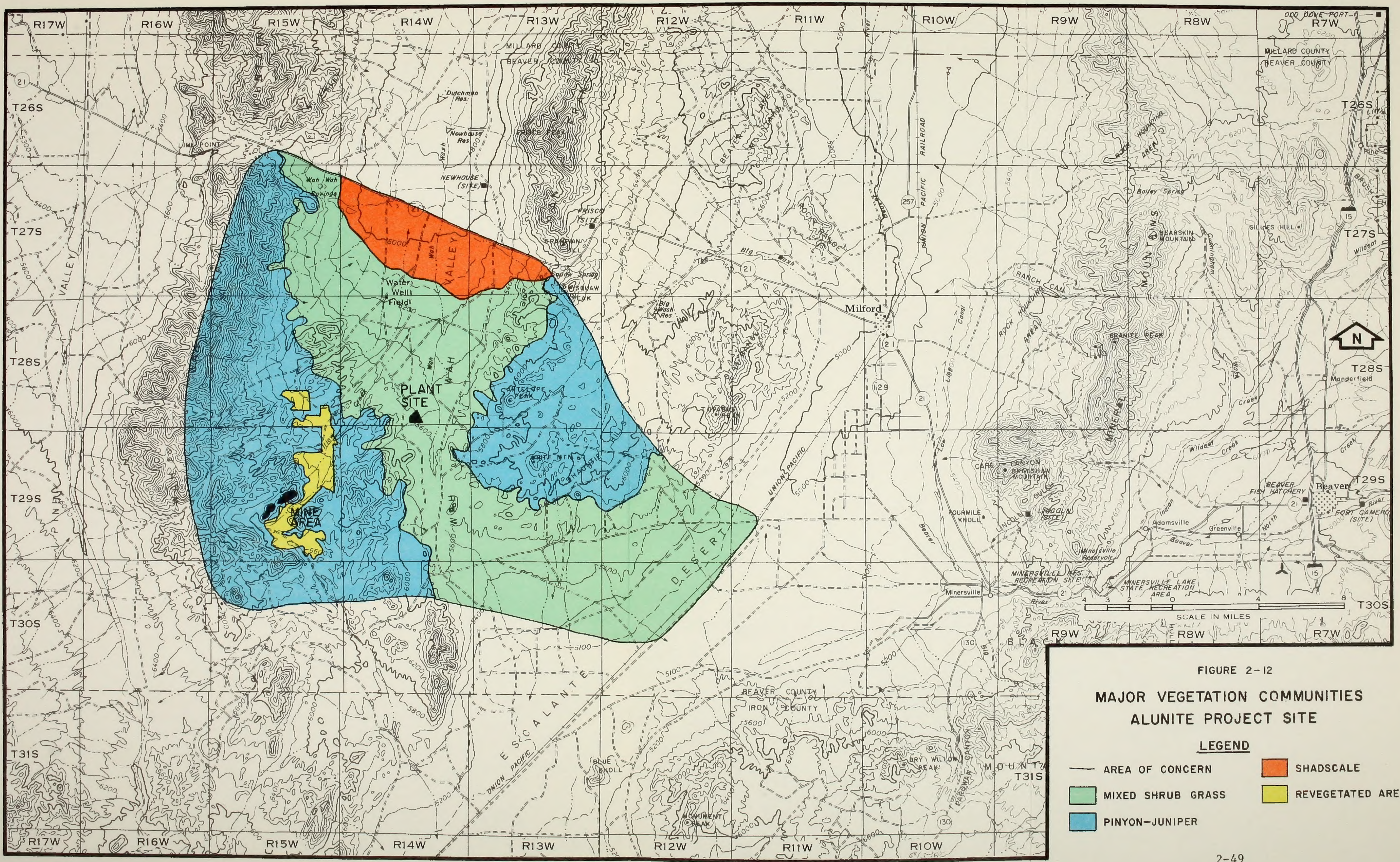


FIGURE 2-12

MAJOR VEGETATION COMMUNITIES
ALUNITE PROJECT SITE

LEGEND

— AREA OF CONCERN	🟧 SHADSCALE
🟩 MIXED SHRUB GRASS	🟨 REVEGETATED AREA
🟦 PINYON-JUNIPER	

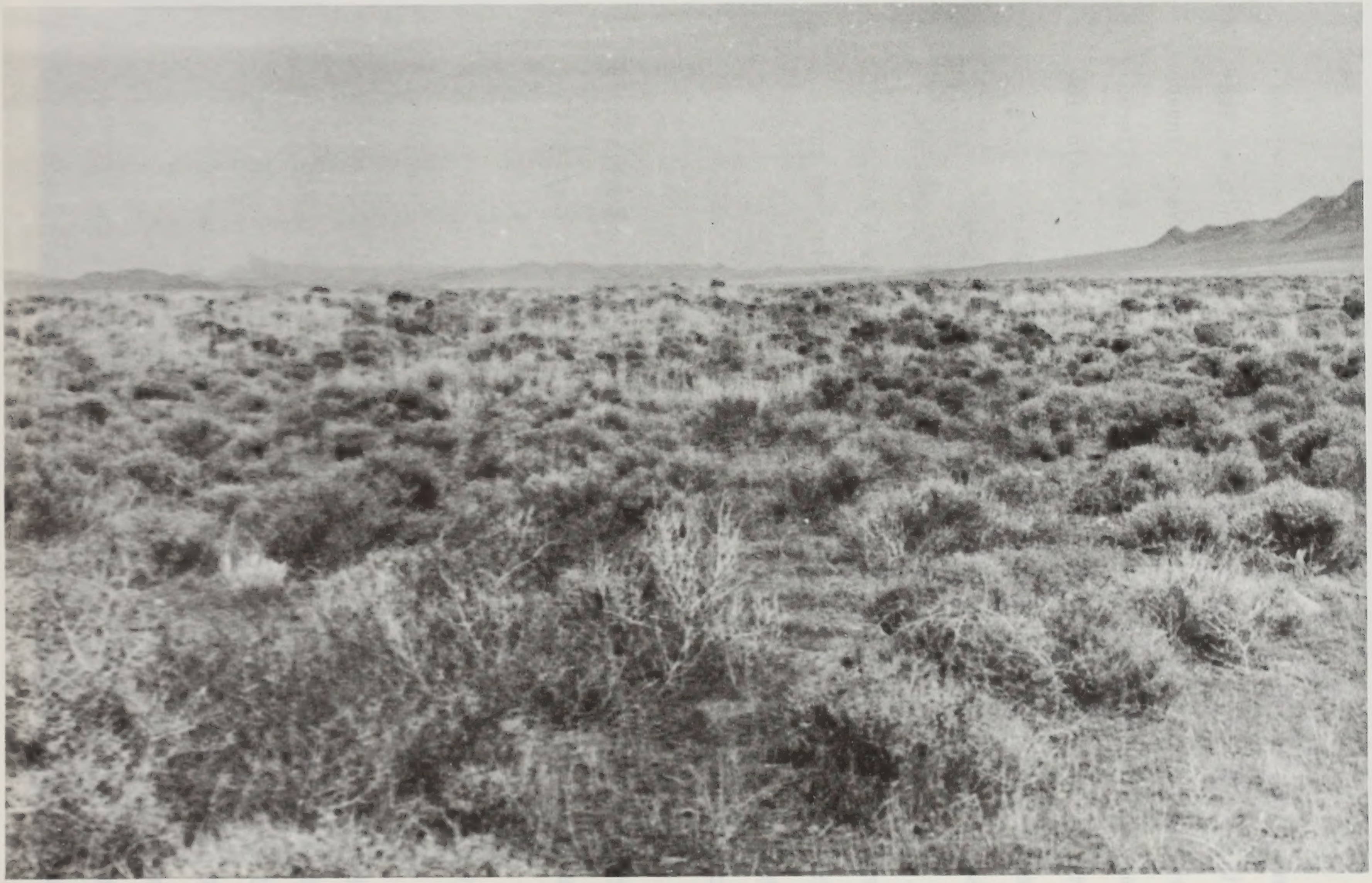


Figure 2-13
MIXED SHRUB-GRASS COMMUNITY
IN WAH WAH VALLEY

green longer into the dry summer months, they provided better nutrition for grazing livestock, wild horses and wild animals which, in turn, led to overgrazing and subsequent invasion by other species. Several invader species are now present indicating that this community has been altered by livestock use. The predominant invaders are cheatgrass and halogeton which are introduced species and now grow where more valuable grazing plants, such as perennial grasses and forbs, were once present.

Big sagebrush, one of the major shrub species of this community, grows where soils are deep and fertile. Whenever there is a mature sagebrush sub-community, there are few other dominant plants and the sagebrush often excludes understory species.

Black sagebrush is the dominant shrub where soils are shallow and rocky.

Little rabbitbrush and snakeweed (native shrubs) invaded areas where both black sagebrush and winterfat were killed out by livestock grazing. These invaders provide practically no forage for livestock, but studies by the State Division of Wildlife Resources indicate that antelope make some use of these plants.

Pinyon-juniper community. This community (fig. 2-14) occupies the hills and higher elevations (6,000 to 9,000 feet) in the area and is dominated by Utah juniper, and single-leaf and double-leaf pinyon pine. Some of the major plant species of this community are utilized by deer as food and for cover.

Scattered stands of ponderosa pine, aspen, white fir, and bristlecone pine occur at higher elevations in adjacent mountains. These

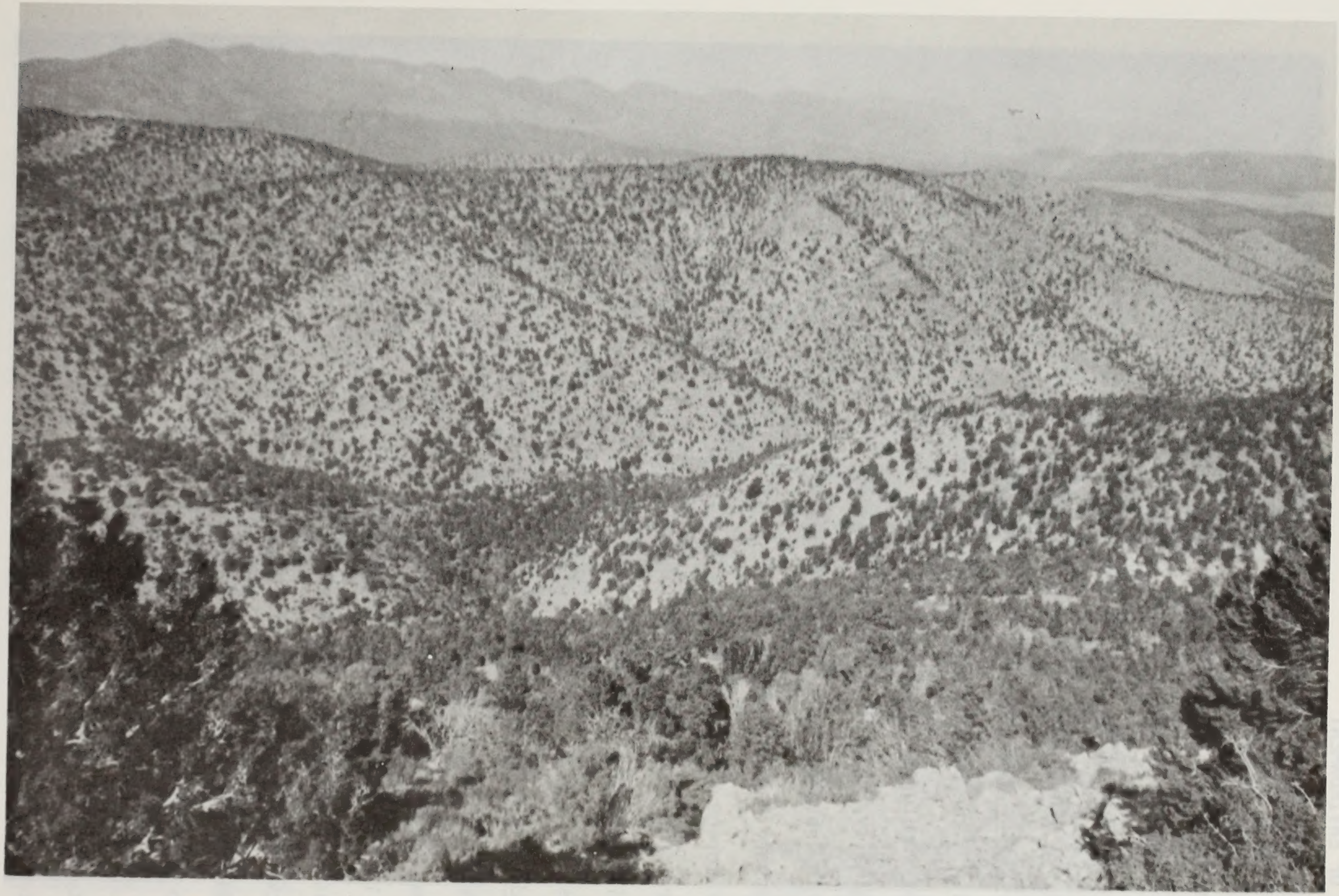


Figure 2-14
TYPICAL PINYON-JUNIPER COMMUNITY
IN AREA OF PROPOSED ALUNITE MINE

forest communities are not plotted on the regional vegetation map due to the small areas involved.

The area also offers recreation such as Christmas tree cutting and harvesting of pine nuts.

Revegetated community. The revegetated area (fig. 2-15) is established within the pinyon-juniper - big sagebrush zone and now consists of crested wheatgrass, native forbs, and shrubs.

Originally, this community was vegetated by pinyon-juniper or big sagebrush. The objectives for maintaining the revegetated communities are to improve the watershed, improve wildlife habitat, and increase the amount of forage for domestic animals. Domestic livestock and wild horses are in direct competition for forage in this community. Wild horses will probably concentrate in this community as the herd size increases.

Shadscale community. This community, figure 2-16, is dominated by shadscale which occurs in the more saline, fine-textured, gray desert soil areas of the valley floor. There are sub-communities of winterfat and small rabbitbrush within the shadscale communities. Native perennial grass was associated with the winterfat in the past, but overgrazing by livestock reduced the amount of grass, and rabbitbrush invaded (Stewart et al 1940). Halogeton, an introduced weed species poisonous to livestock, has also invaded disturbed or overgrazed areas.

Project site. Table 2-13 identifies the acreage of each vegetative community at the proposed project site. These figures represent only a small portion of the area described in the regional setting.

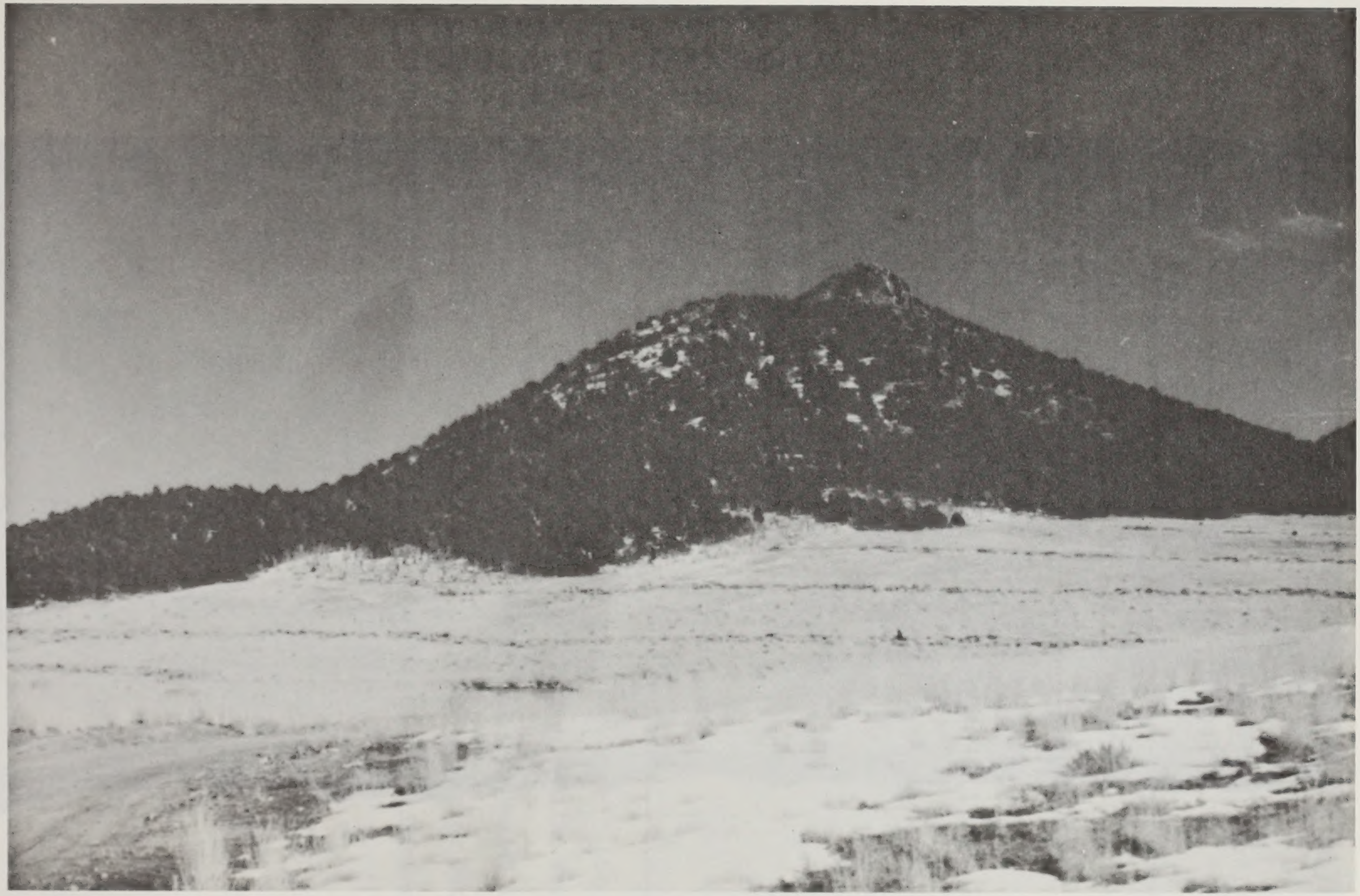


Figure 2-15
REVEGETATED COMMUNITY
JUST SOUTH OF PROPOSED ALUNITE MINE

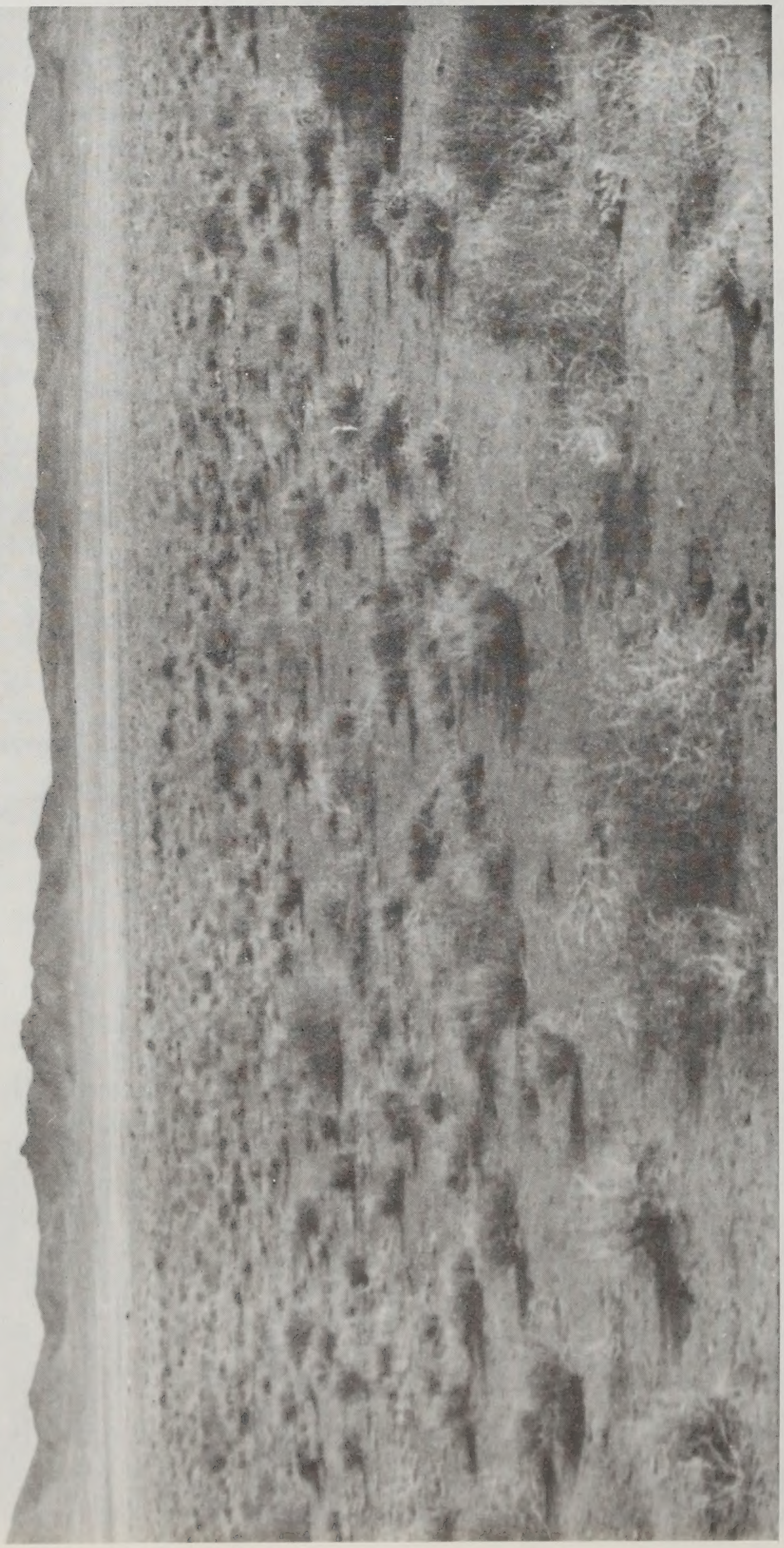


Figure 2-16
SHADSCALE COMMUNITY
IN WAH WAH VALLEY

Table 2-13. Vegetation communities at the proposed Alunite project site in Wah Wah Valley

	Major vegetative communities (acres)			
	Mixed shrub-grass	Pinyon-juniper	Revegetated	Shad-scale
Alunite mine (including spoil pile)	19	453	15	--
Processing plant complex	1,504	--	--	--
Water system	66	--	--	--
Transportation system	260	--	--	20
Construction material sites	65	--	--	--
Communication facilities	--	7	--	--
Total	1,914	460	15	20

Threatened and endangered species. Inventory work within the area of concern is limited to the project site. An extensive survey of areas that would be disturbed was completed by BLM personnel during October 1975 (after the flowering period), and no threatened or endangered species were found.

WILDLIFE AND WILD HORSES

Regional setting. The geographic area of concern outlined in figure 2-17 contains wildlife habitat that could be directly influenced by construction and/or operation of the proposed alunite project. The animal species list (appendix C) for the area includes 59 mammals, 99 birds, 17 reptiles, and 1 amphibian. Animals of major interest to man are discussed below. These are species that provide a recreation experience either from hunting or observation in their natural habitat. General distribution patterns of these major interest animals within the region are shown in figure 2-17.

Mule deer. A small resident population utilizes the area year-round. There is very little in or out seasonal migration of deer in this region. The lack of high quality summer range is probably the limiting factor influencing the deer population. Game management personnel from the Utah Division of Wildlife Resources feel that hunting pressure and the high densities of mountain lion and coyotes may be compounding with range conditions to suppress the ratio of recovery of these deer populations.

Deer compete with domestic livestock and wild horses for forage and water. The revegetated community provides spring and fall forage for all species. Some preferred deer browse species in the area are: alder-leaf mountain mahogany, curl-leaf mountain mahogany, bitterbrush, cliffrose, and sagebrush (Reynolds, 1960).

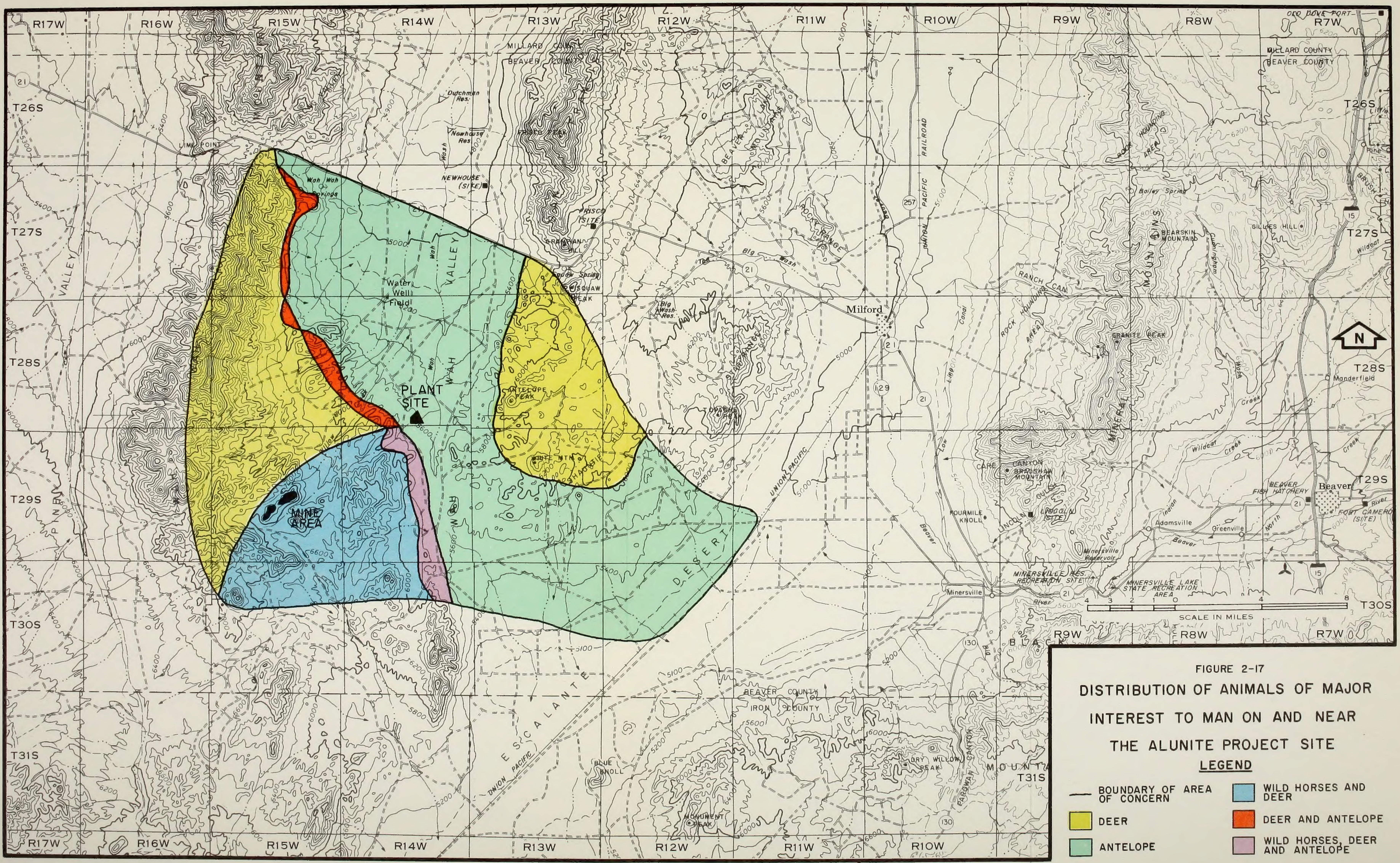


FIGURE 2-17

DISTRIBUTION OF ANIMALS OF MAJOR INTEREST TO MAN ON AND NEAR THE ALUNITE PROJECT SITE

LEGEND

— BOUNDARY OF AREA OF CONCERN

🟨 DEER

🟩 ANTELOPE

🟦 WILD HORSES AND DEER

🟥 DEER AND ANTELOPE

🟪 WILD HORSES, DEER AND ANTELOPE

Mountain lion. The mountain lion was declared to be a game animal in Utah in 1967. The population density is not known, but 13 were harvested during 1974 and 1975 within the deer herd unit which includes the proposed project site (Division of Wildlife Resources, 1975).

Mountain lions feed mainly on mule deer and porcupines. Other food items in the eastern Great Basin include rabbits, hares, beaver, skunks, horses, cows, dogs, elk, goats, mice, ground squirrels, and grass (Robinette et al., 1959).

Raptors. At least 14 species of raptors (see appendix C) have been observed in the area. Red-tailed and ferruginous hawks are common and are usually present all year long. Golden eagles reside in the area year-round but are only observed occasionally because their range includes more than Wah Wah Valley and the surrounding mountains. Northern bald eagles are observed occasionally during winter months. Observations by BLM employees indicate the area is primarily used by raptors for hunting prey (small mammals, birds, and reptiles). Extensive surveys have not identified concentrated raptor nesting within the area.

Antelope. Pronghorn antelope are present and obtain part of their forage from the area during all seasons of the year. However, they range over a much larger area for all of their food and habitat requirements.

Beale and Smith (1970, 1973) indicate that black sagebrush is the major browse species utilized by antelope in this area during the fall and winter months. Forbs are also important in their diet during the spring and summer. Antelope utilize both the mixed shrub-grass and shadscale vegetation communities. Trend counts for the total southwest desert antelope population indicate populations are decreasing (Division of Wildlife Resources, 1975). The reason for this trend has not been established.

Other mammals. There is a wide range of small mammals in the area. Carnivorous mammals such as coyote, bobcat, and fox are hunted and trapped in the fall and winter for their fur.

Project site. Acres of wildlife and wild horse habitat within the proposed alunite project site are identified in table 2-14.

Little acreage of high quality native wildlife habitat occurs in the project site. Less than 15 acres of the revegetated area is within the proposed project site. None of the deer habitat is considered to be critical winter range.

Table 2-14. Acres of deer, antelope and wild horse habitat at the proposed Alunite project site

	(acres of habitat)		
	Deer	Antelope	Wild horses
Alunite mine	473	14	473
Processing plant complex	--	1,504	--
Water system	--	66	--
Transportation system	45	280	45
Construction material sites	15	50	15
Communication facilities	7	--	7
Total	540	1,914	540

Wild horses. A wild horse herd migrates in and out of the area (see figure 2-17). Twenty-nine animals (22 adults, 7 colts) were counted by BLM employees on January 7, 1976 during a helicopter survey. The horses will probably concentrate in the revegetated community as herd size builds up because of the easy availability of grass for forage.

Endangered species. Although the project site is within the range of the endangered peregrine falcon, no peregrine falcon sightings have been recorded for the area.

CULTURAL RESOURCES - HISTORY AND ARCHAEOLOGY

Regional setting. The geographic area of concern for cultural resources encompasses the area in which historical structures and archaeological resources could either be directly affected by construction activities associated with the proposed project, or indirectly affected by the increased number of people who would be visiting and working in the area (fig. 2-18).

Historical activity first occurred in this portion of Utah with exploration by the Dominguez-Escalante Party in 1776 and Jedediah Smith in 1826. There is no physical evidence of these explorations. Actual colonization began by 1857 with the Mormon culture. Part of Beaver County became the focus for later events, including the development of presently existing towns, along with the mining "boom and bust" ghost towns of Newhouse and Frisco during the late 1800s and early 1900s (fig. 2-18). There are still some limited structural remains at Newhouse.

However, numerous buildings in various stages of decay dot the landscape of the abandoned townsite of Frisco.

Archaeological sites from early cultures may be present in the region since evidence of these cultures has been found throughout western Utah. The early cultures include the Llano, Folsom and Plano Big Game Hunters - 12,000 B.C. to 5000 B.C. - and the hunting and gathering Archaic groups - 9000 B.C. to A.D. 1. For later periods, the region displays archaeological recordings of the agriculturally-based Fremont - A.D. 400 to A.D. 1300 - and the hunting and gathering Southern Piute. The Southern Piute are known to be similar in some respects to the Archaic culture.

Since archaeological sites are the only source of resource information on ancient human cultures, such information has considerable scientific and general interest. Historical structures also have some scientific values, but their major appeal is to the general sightseeing public.

Project site. An archaeological and historical survey conducted by Brigham Young University (BYU), (Berge, 1974), is the principal data source on the project site. This survey covered the entire area of the proposed alunite mine. It also covered the proposed processing plant site, but did not cover the area that would be used for tailings ponds, sewage disposal, and gravel pits. Support facility locations for access roads, the railroad spur, and the water system were not surveyed. Also surveyed were portions of Blawn Wash not directly involved in proposed project construction activities. The BYU survey was apparently thorough, but site records are very sketchy as regards description and evaluation.

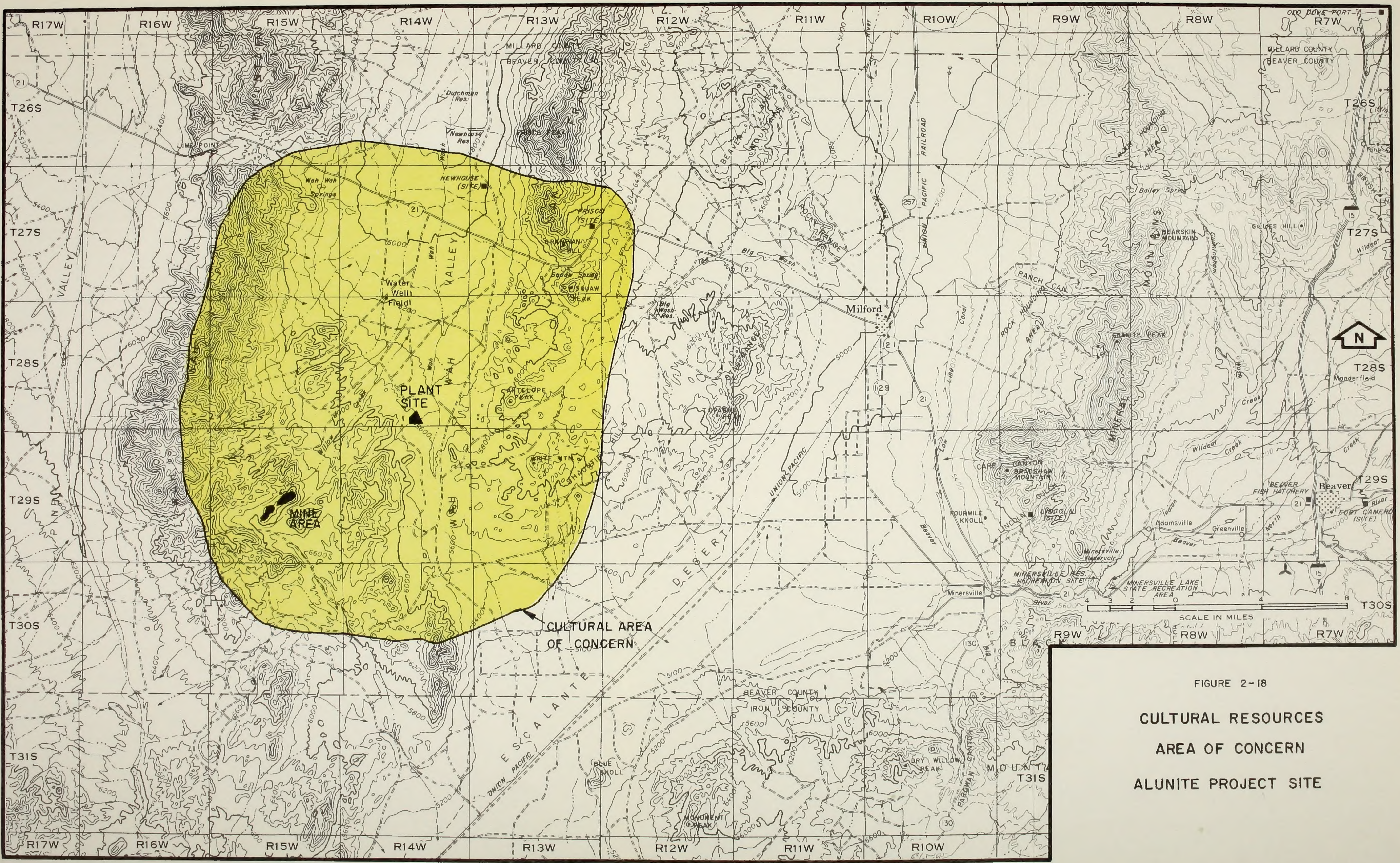


FIGURE 2-18

CULTURAL RESOURCES AREA OF CONCERN ALUNITE PROJECT SITE

Also, analysis of survey results is based on two questionable assumptions: (1) that sites are rendered valueless by chaining, and (2) that depth can be ascertained through surface examination only.

Using the University survey maps and data, several archaeological and historical sites have been identified (using map plots) within 2 miles of the project site.

Historical resources. Only a few historic resources were found. Historical sites are summarized below for each project component:

Mine. One site, a 10-foot by 10-foot rock and log cabin, was found in the area proposed for mine spoil disposal. The scientific value of this cabin is unknown; however, it is of fairly recent origin. Since the site was recorded by a trained, professional historical archaeologist, and no recommendation was made for further work, it is assumed that the site has very limited potential for the recovery of data of scientific value.

Processing complex. No historic sites were found in the area surveyed.

Adjacent areas. A three-room rock house and a dugout were found about 2 miles south of the proposed alunite mine. The BYU survey team recommended excavation to determine their historic value. Several charcoal kilns are located about 2 miles northwest of the proposed alunite mine. The character and state of preservation of these kilns is not known.

Archaeological resources. Archaeological sites are summarized below for each project component. The scientific value and complete description of these sites were not determined or fully documented by the BYU survey.

Mine. The mine area was fully surveyed. Eighteen sites were recorded, mainly along the conveyor, road, and transmission line routes. Nine sites were recorded within approximately 100 yards of the proposed mine water system or between the conveyor route and water system in areas of potential construction activity.

Processing complex. No sites were recorded. However, less than 25 percent of the area was examined.

Adjacent areas. Fifty sites were located within 2 miles of the project site, mainly in Blawn Wash to the south and southwest of the alunite mine. Since only a portion of this area was surveyed (2+ sections), an unusually high site density is indicated, and the area must be considered as an important archaeological locale.

National Register. As far as can be abstracted from the data presently available, there do not appear to be any historic or archaeological sites within or immediately adjacent to the project area that warrant consideration for nomination to the National Register of Historic Places. Further survey, testing, and salvage might change this viewpoint, however. If so, appropriate procedures would be initiated to include contact with the Advisory Council on Historic Preservation.

Neither Newhouse or Frisco are on the State Register, although they are noted as potential properties. Frisco in particular is probably a suitable candidate for nomination to the National Register. However, until such time as it is nominated or a decision as to eligibility is requested, this document will treat it as only a point of local historical interest. The site is on private land.

AESTHETICS

Regional setting. The geographical area of concern for visual aesthetics is shown in figure 2-4. This area was selected because it contains all the major components of the proposed project that could be seen from public transportation routes (see figures 2-5, 2-6, and 2-7 in the Topography section of this chapter).

The processing plant complex, alunite mine and microwave communication route would be constructed in an area that provides background scenery for Utah Highway 21. These components would be located approximately 10 miles south of the highway. The major access road would connect U-21 with the processing complex and would run diagonally across Wah Wah Valley. Highway 21 receives only light use. According to the Utah Department of Transportation an average of 75 vehicles per day used this highway in 1974. Five percent of these vehicles were from states other than Utah, and 15 percent was heavy truck traffic.

Portions of the proposed railroad spur and maintenance road could be seen from the Union Pacific Railroad line in Escalante Valley. There are no passenger trains on this route at the present time.

The open space flatlands, hills, and mountains of the region are similar to most of the desert valleys and mountain ranges of western

Utah. Colors are drab, landforms blend together (no unusual patterns), and there is no surface water present. The area is not unique and is low in scenic quality when compared to the National Forests and National Parks in other parts of the state.

Project site. The processing plant complex and railroad would be located in the flat, barren valley bottoms of Wah Wah Valley and the Escalante Desert. There is very little color or texture contrast in this topography. These areas have been classified by BLM as having low scenic quality (Wah Wah Planning Unit - Unit Resource Analysis, 1973).

There is a variety in the landforms and vegetation in the vicinity of the proposed ore conveyor system and mine site. The flat, barren valley bottoms give way to pinyon-juniper-covered ridges with occasional rock outcrops. A variety of soils, rock, and vegetative types provide a pleasant variation in colors and textures.

The mine site ridge is similar in character to other ridges in the vicinity. Mineral exploration road systems are evident along the entire ridge system. Removal of pinyon-juniper trees by revegetation projects at the base of the mine site has also altered the natural appearance of the area. The project site is located in an area that has been classified by BLM as having moderate scenic quality (Wah Wah Planning Unit - Unit Resource Analysis, 1973).

LAND USE

Regional setting. The geographic area of concern for land use is shown in figure 2-19. Land uses such as recreation, agriculture, urban residential and mineral development could be affected by project-induced population increases.

Most of the lands in Beaver and Iron counties are public lands administered by the Bureau of Land Management, National Park Service, and U.S. Forest Service. Table 2-15 shows percentage figures of land ownership for the region.

Table 2-15. Land ownership patterns (County Economic Facts, 1975, Bureau of Economics and Business Research, University of Utah, Salt Lake City, Utah)

	Beaver County	Iron County
Federal	77.30%	48.30%
State	9.38%	6.32%
Private	13.31%	35.37%

The regional setting for each major land use category is described in this section.

Recreation

Fishing. Minersville Reservoir, located about 15 miles southeast of Milford, provides excellent trout fishing. The Utah State Division of Parks and Recreation has constructed a 29-unit, high-density campground at the southwest corner of the reservoir. In addition, a double-wide boat ramp, fish cleaning station, and an overflow parking area for heavy use periods are available. During June (heaviest use period) of 1974, 15,295 people visited the reservoir. Camping facilities are not adequate to meet the demand during heavy use periods, and most visitors camp or park on unimproved private and national resource lands adjacent to the reservoir. The Utah State Division of Parks and Recreation has no plans to enlarge the camping and boating facilities.

Hunting. Mule deer is the most plentiful and most hunted big game animal in Utah. Harvest figures compiled by the Department of Wildlife Resources show that hunter success is decreasing in all areas of the state. Specific harvest information is not available, but an analysis of Division of Wildlife Resources data indicates that this region accounted for approximately 2 percent of the deer harvest and 2.6 percent of the hunter days for the state in 1974. Hunter success was estimated to be 15 percent. The low rate of hunter success can be attributed to the "buck only" regulation which was implemented for this region in 1974.

The entire Cedar Antelope Hunting Unit and approximately one-half of the Southwest Desert Antelope Hunting Unit are included in the region. Based on an analysis of Division of Wildlife Resources harvest data for 1974, it is estimated that this region accounted for 13 percent of the permits sold, 20 percent of the hunter days, and 26 percent of the antelope harvested in the state. Hunter success was estimated at 38 percent.

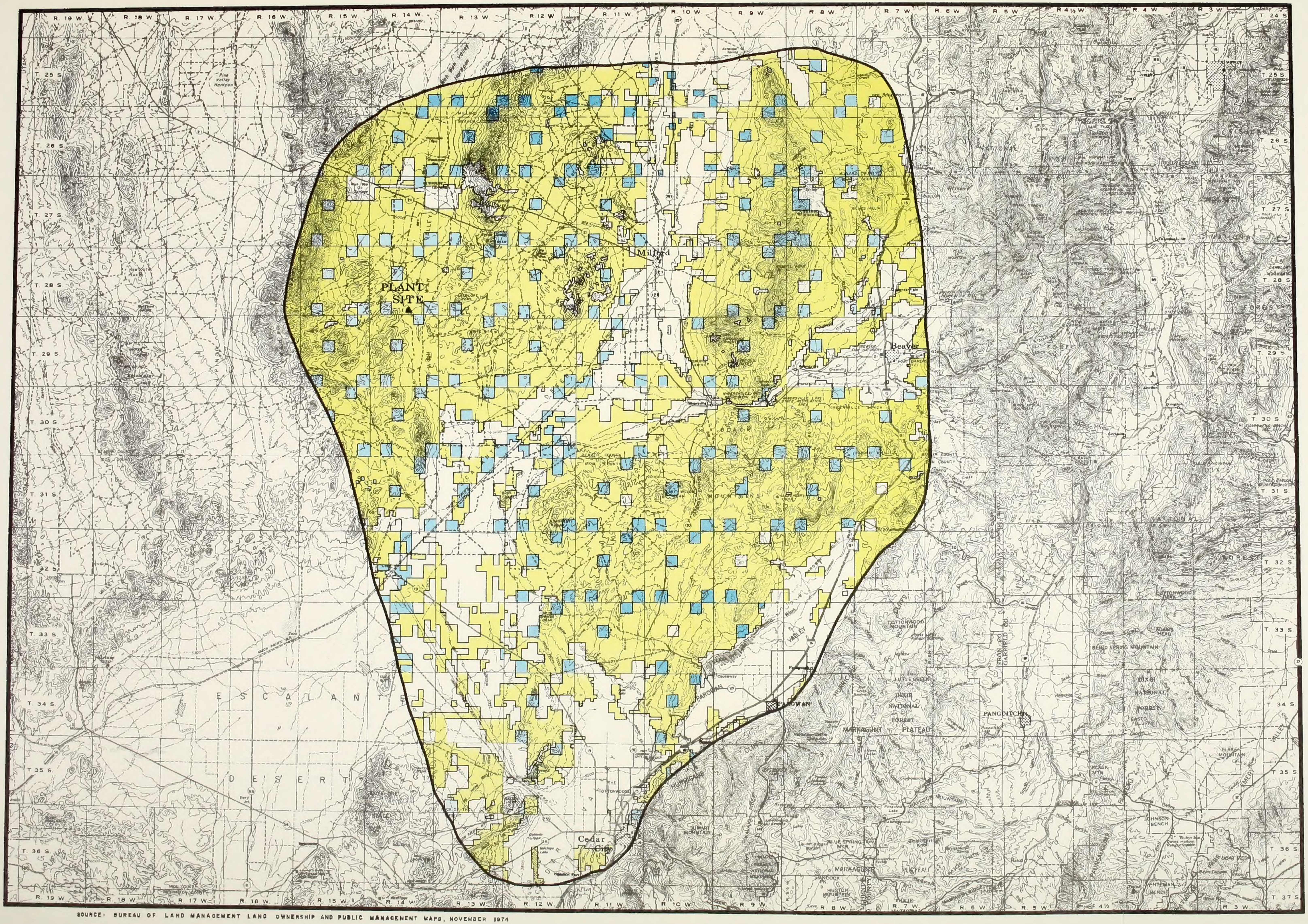


FIGURE 2-19

LAND USE AREA OF CONCERN & LAND OWNERSHIP STATUS IN THE REGION ALUNITE PROJECT SITE

SOURCE: BUREAU OF LAND MANAGEMENT LAND OWNERSHIP AND PUBLIC MANAGEMENT MAPS, NOVEMBER 1974

Five upland game species were reported as being hunted in the region during 1974. They include pheasant, chukar partridge, mourning dove, sage grouse, and cottontail rabbit.

Skiing. Two ski areas are located within the region. Brian Head, located 30 miles northeast of Cedar City, draws most of its patronage from Las Vegas and Southern California, with only a small percentage coming from local communities. Mt. Holly, Utah's newest ski area, is located 17 miles east of Beaver. Operators of both ski areas report their facilities are not being fully utilized.

Collecting. National resource lands are the primary locations for rock collecting. Volcanic activity has produced an abundance of obsidian ranging from "snowflake" to "brown fleck." The Mineral Mountains east of Milford are one of the few locations in the west where "smoky quartz crystal" is relatively abundant. The region is highly mineralized and many mineral specimens suitable for collection can be found, particularly in abandoned mine dumps. However, the region receives only light use from rock and mineral collectors becuase of its isolated location.

Christmas tree and firewood cutting as well as pinyon pine nut collecting are popular recreation activities for local residents. The quality of pinyon Christmas trees in the region is the finest in the state but distance from large population centers has allowed the demand to remain moderate. The local cutting of firewood for personal use is increasing.

Sightseeing. Southwestern Utah is referred to as "Utah Color Country." The brilliant multicolored erosion features of Bryce and Zion national parks and Cedar Breaks National Monument, combined with the alpine meadows and lakes of the Dixie and Fishlake national forests and the desert valleys and mountains, provide a variety of scenic attractions. The National Parks and Monument attract the most visitors. Over 70 percent of the visitors to these areas are out-of-state recreationists. However, in Fishlake National Forest, 70 percent of the recreation use is generated from within the state. The desert lands within the alunite area of concern are the least frequently visited because of their relatively low scenic values and location with respect to major travel zones.

Off-road vehicle use. Off-road vehicle use is very light within the region because of the absence of large, adjacent population centers. Some moderate use occurs on private lands near residential areas, but there is no evidence of concentrated use on national resource lands. Most off-road vehicle use in the area occurs in conjunction with other activities such as hunting or mineral exploration.

Agricultural. The grazing of sheep and cattle occurs on most of the land within the region. U.S. Forest Service lands at higher elevations are grazed by sheep and cattle during the summer months. National resource lands provide forage throughout the year for both sheep and cattle but are used primarily during the winter in the western part of the region. Private rangeland is generally used during the spring and fall.

Agricultural cropland is irrigated with either surface water from mountain streams or from high-volume pump wells. The Hydrology section of this chapter discusses the relationship between water availability and cropland. All water in the Escalante Valley has been fully appropriated and no more irrigated cropland can be developed. Cropland in the region is located in the Escalante Desert, Beaver Valley, and Cedar Valley. There are approximately 200 acres of irrigated cropland located at the Wintch ranch in Wah Wah Valley (see fig. 2-19). The residential areas of Cedar City, Beaver, Minersville, Milford, Enterprise, and Parowan are located in the agricultural cropland areas. The principal crops are alfalfa hay, small grains, potatoes, silage corn, and forage crops. Table 2-16 summarizes private land uses in Beaver and Iron counties.

Table 2-16. Land use in Beaver and Iron counties excluding federal, and urban land and small water bodies (Soil Conservation Service, U.S. Department of Agriculture, "Utah Conservation Needs Inventory Report," October, 1970)

	Beaver County		Iron County	
	Acres	Percent	Acres	Percent
Total	1,655,680	100.00	2,112,000	100.00
Cropland	40,109	2.42	81,136	3.84
Pasture	4,001	.24	17,830	.84
Range	265,721	16.05	445,196	21.07
Forest	58,031	3.50	321,375	15.21
Other	8,622	52	16,542	.78

Urban/Residential. The largest city in the area of concern is Cedar City with an estimated population of 10,000. Other residential communities include Milford, Beaver, Minersville, and Parowan, all of which have populations of less than 2,000. Scattered residential areas are located near all of these communities.

Mineral development. In the past, mining activity was widespread throughout the region. At the present time, the only significant mining activity is the operation of iron mines near Cedar City by Utah International and U.S. Steel. The level of prospecting and mineral exploration for uranium, base metals, and geothermal energy by both large organizations and individuals is relatively high throughout the region.

Project site. Land use in the proposed project area is limited to livestock grazing, mineral exploration, and recreational activities. The dominant use is livestock grazing.

Grazing. Components of the proposed alunite project are located in six grazing allotments. Figure 2-20 shows allotment boundaries and project components. The total grazing capacity of these six allotments is 23,405 animal unit months (1 AUM equals forage consumed by one cow or five sheep for 1 month). Within these six allotments, approximately 219 AUMs are located on areas that would be occupied by the proposed project (see table 2-17). Of the 219 AUMs, 19 are located at the proposed mine area, 164 at the processing plant area, and 36 at offsite facilities such as roads, railroad spur, and water facilities.

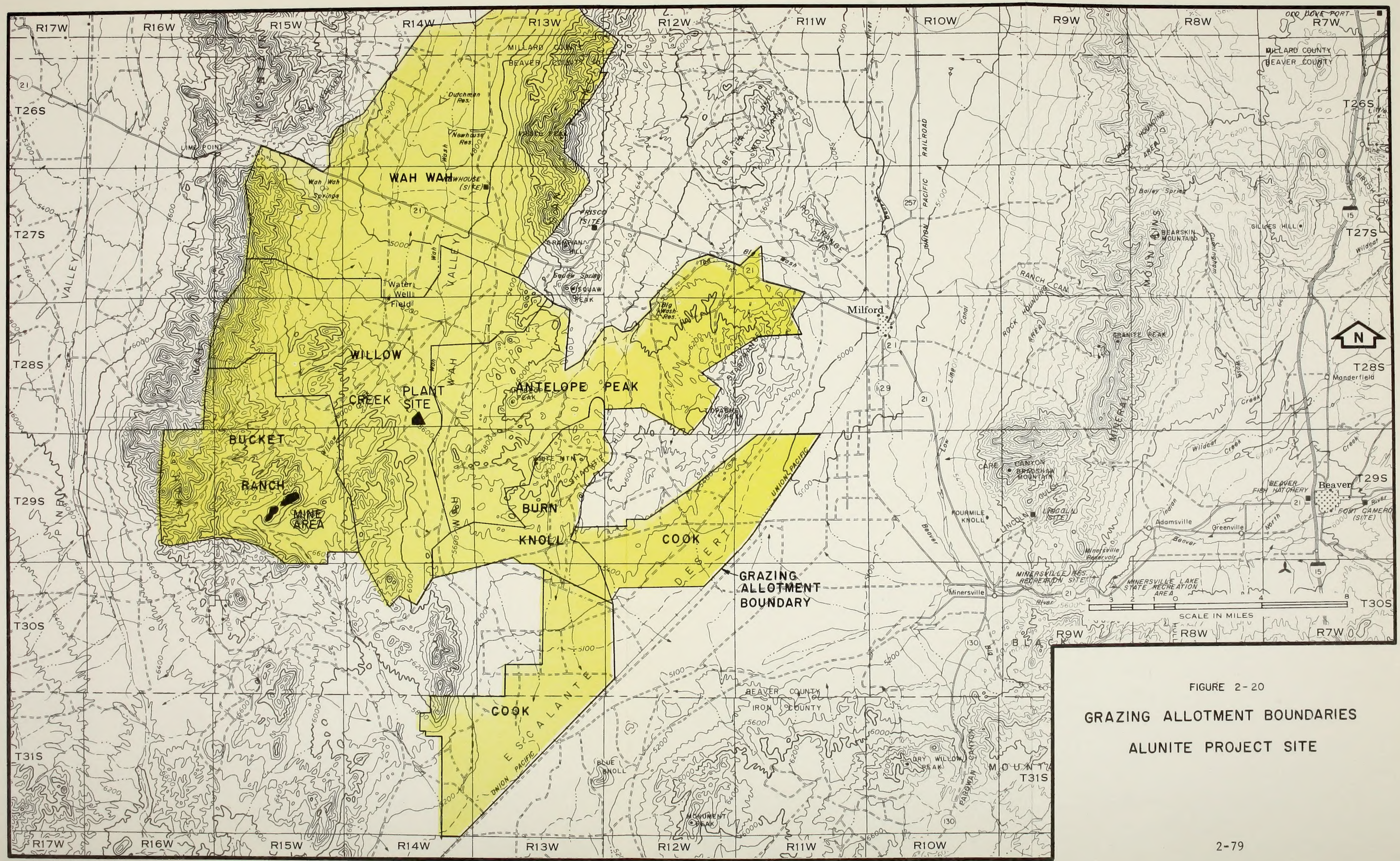


FIGURE 2-20

GRAZING ALLOTMENT BOUNDARIES

ALUNITE PROJECT SITE

SOURCE: B.L.M. BEAVER RIVER RESOURCE AREA, LIVESTOCK FORAGE ALLOTMENTS, WAH WAH PLANNING UNIT, UNPUBLISHED MAP, 1971.

Table 2-17. Grazing use summary - project site

Allotment	Operator	Class of livestock	Season of use
Antelope Peak	Hatch	Sheep	Spring-winter
Willow Creek	Cannon	Sheep-cattle	Winter
Burn Knoll	Lamoreaux	Cattle-horses	Spring-winter
Cook	Minor	Cattle	Yearlong
Bucket Ranch	Wintch	Sheep-cattle	Spring-summer
Wah Wah	Wintch	Sheep-cattle	Spring-winter

Recreation. Recreation use of the proposed project site includes hunting for deer and antelope, cutting Christmas trees, collecting pine nuts and gathering firewood.

The project site lies within deer herd 62C. During the 1974 deer hunt, this unit accounted for 541 hunters afield who harvested 122 deer (23 percent success). Hunting pressure in the vicinity of the project site is light.

The project site lies within the Southwest Desert Antelope Unit. Table 2-18 shows harvest data for this herd unit. This unit is extremely large, extending from Delta to Modena and west to the Nevada State line. In 1974, 50 antelope permits were issued for this unit. This number represents 19 percent of the permits sold in the state. There were 23 bucks harvested resulting in 49 percent hunter success. The unit had 19 percent of the hunting pressure and 12.5 percent of the hunter success for the state. Hunter success for this unit was 23 percent lower than the state average of 72 percent. Antelope are frequently observed by BLM personnel in the area of the proposed plant site and several have been harvested in Wah Wah Valley in recent years. However, specific information on hunting pressure is not known.

Table 2-18. Harvest data for the Southwest Desert Antelope Herd (Division of Wildlife Resources, 1975)

Year	Permits sold	Hunters afield	Kill			Percent success
			Buck	Doe	Total	
1969	29	28	22		22	78
1970	30	29	23		23	79
1971	30	29	22		22	76
1972	35	34	26		26	76
1973	35	35	21		21	60
1974	50	47	23		23	49

The proposed mine site lies at the eastern edge of an excellent Christmas tree and pine nut collecting area (see fig. 1-2), mainly used by residents of Beaver, Minersville, and Milford. There are no figures available on the quantity of woodland products that are harvested in this area. Christmas trees have been cut illegally for many years and pine nuts are gathered on a free-use basis by family groups for personal use.

Mineral exploration. There are at least two mining claims in addition to claims filed by the applicant in the specific areas proposed for the location of alunite project components. There are numerous mining claims in the general area of the project site and the applicant considered these claims in proposing locations for the alunite mine, processing plant, and offsite support facilities. At the present time there is no evidence of development activity on existing mining claims within 2 miles of the project site. However, work has been performed within the last 2 years on at least two claims located approximately 2 miles from the proposed alunite mine. No information on the potential mineral value of these claims is available.

Summary of land use by component for the proposed project. Table 2-19 shows land use for major components of the proposed project.

Table 2-19. Acreage summary for each land use at the proposed project site

	Land use - acres			
Project component	Grazing	Woodland products	Deer hunting	Antelope hunting
Alunite mine	487	473	473	14
Processing plant	1,504	--	--	1,504
Water system	66	--	--	66
Transportation system	280	--	45	280
Construction materials	65	--	15	50
Communication facilities	7	7	7	--
	2,409	480	540	1,914

SOCIOECONOMIC CONDITIONS

Introduction

Geographic area of concern. The proposed project would be located in a sparsely populated area of Beaver County. The anticipated new population associated with the project would be expected to live in the nearest communities offering satisfactory living conditions, i.e., Milford, Minersville, and Beaver. The total population of these three communities is less than 3,500 people, and only limited services are available. Cedar City (population 10,000), approximately 90 miles driving distance from the proposed site, may be a more attractive community to some of the new population. Thus, the socioeconomic values described would be applicable to all of Beaver and Iron counties, concentrating on the major communities of Milford, Minersville, Beaver, and Cedar City (see figure 2-21).

Background and trends. Beaver County was first settled in the 1850s. The discovery of silver several decades later created a boom situation. Railroad connections to Milford led to further growth as a major cattle shipping center. When the silver ran out, most of the boom towns disappeared and Beaver County's population stagnated until the 1940s (Bureau of Economic and Business Research, 1967). Since then, lack of job opportunities led to several decades of outmigration and declining population, which characterized Beaver County until 1970. Declining unemployment and increasing job opportunities, resulting from geothermal exploration and an improving agricultural economy, are now slowing outmigration of residents.

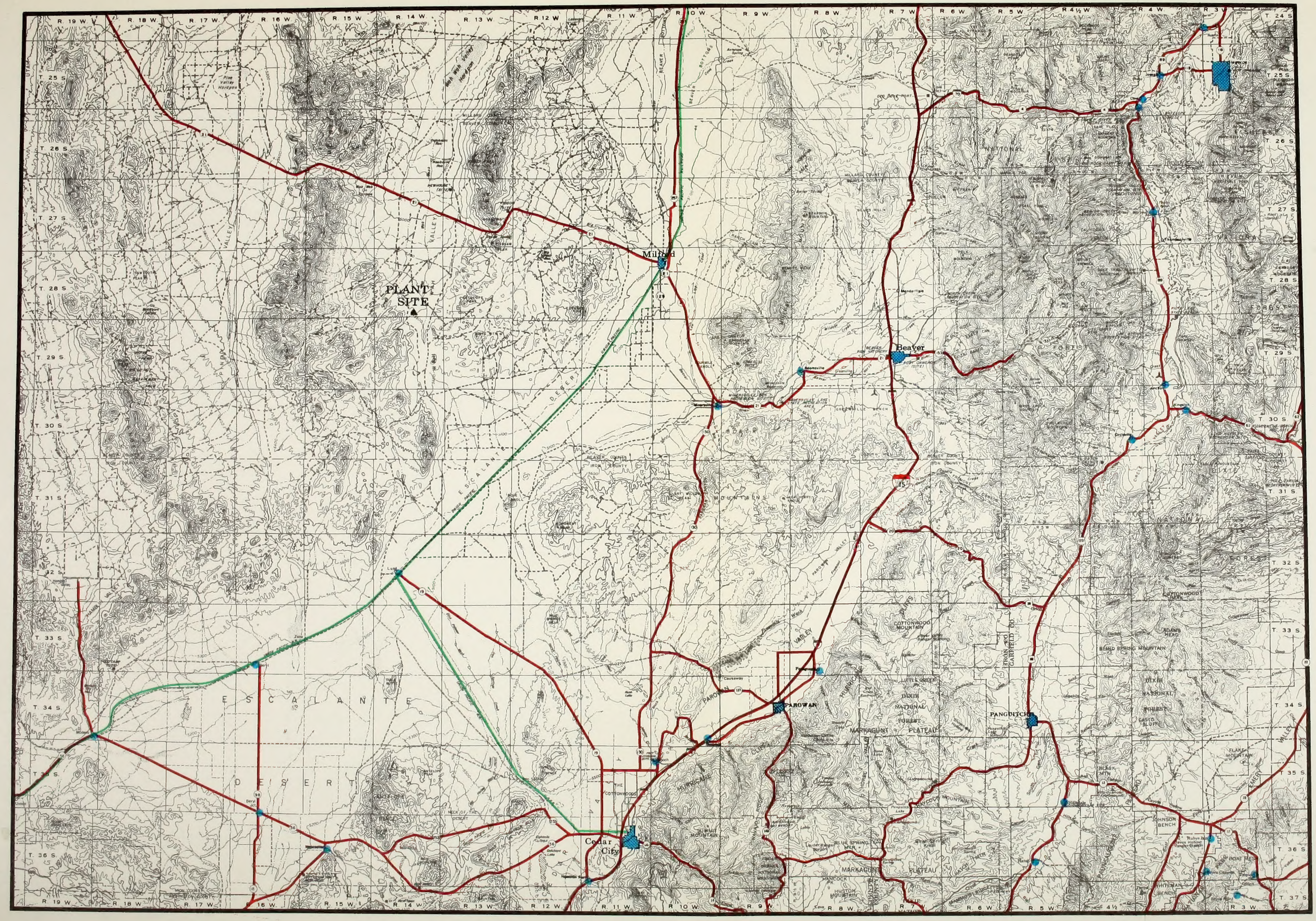


FIGURE 2-21

COMMUNITIES AND TRANSPORTATION NETWORK ADJACENT TO ALUNITE PROJECT

Iron County was settled in 1849. The population has relied primarily on farming and livestock and, in later years, on iron ore production for economic support. Iron County has a long history of sustained growth brought about by the establishment of a broader economic base than that of the surrounding counties (Bureau of Economic and Business Research, 1967). Indications are that growth has rapidly accelerated since the 1970 census, mainly due to the fact that Cedar City, as a regional service center, attracts more new business and new population than other nearby areas.

Population

Past trends. Population patterns in Beaver County have closely resembled most other rural counties in the state over the past several decades. These patterns include declining population, outmigration, and an increasing proportion of the aged. While the population of Utah increased by almost 20 percent between 1960 and 1970, almost half of the state's 29 counties, including Beaver County, lost population during that decade. Beaver County's population fell by 12.3 percent between 1960 and 1970 (U.S. Bureau of the Census, 1971).

Population change has been quite different in Iron County, where population increased by 12.8 percent between 1960 and 1970. However, all of this increase took place in Cedar City; population in the remainder of Iron County actually declined (U.S. Bureau of the Census, 1971). Table 2-20 shows population for Beaver and Iron counties, southwestern Utah, Utah, Mountain States, and the United States and compares the rates of population change.

Table 2-20. Population by census county division in Beaver and Iron counties (U.S. Bureau of the Census, U.S. Census of Population: 1970, Number of Inhabitants, Final Report PC(1)A46, Utah. Washington, D.C.: U.S. Government Printing Office, 1971. U.S. Bureau of the Census Current Population Reports, Series P-25, Nos. 460, 520, 533, 534, 589. Washington, D.C: U.S. Government Printing Office, 1975. U.S. Bureau of Census, U.S. Census of Population: 1970, United States Summary: Number of Inhabitants, Washington, D.C.: U.S. Government Printing Office, 1971)

	April 1960	Average annual growth 1960-70	April 1970	Average annual growth 1970-73	July 1973
Beaver County	4,331	-1.30%	3,800	+1.59%	4,000
Beaver div.	2,012	-1.11%	1,800	--	c
Beaver	1,548	-0.63%	1,453	+3.11%	1,605
Milford-Minersville div.	2,319	-1.47%	2,000	--	c
Milford	1,471	-1.20%	1,304	+0.45%	1,323
Minersville	580	-2.55%	448	+0.95%	462
Iron County	10,795	+1.21%	12,177	+3.69%	13,700
Beryl-Newcastle div.	549	+0.15%	557	--	c
Cedar City div.	8,280	+1.62%	9,720	--	c
Cedar City	7,543	+1.72%	8,946	+3.06%	9,867
Enoch	c	--	120	2.98%	132
Kanarraville	236	-1.45%	204	+2.64%	222
Parowan div.	1,966	-0.34%	1,900	--	c
Paragonah	300	-0.87%	275	+2.61%	299
Parowan	1,486	-0.43%	1,423	+4.17%	1,625
Southwestern Utah[a]	31,641	+1.08%	35,224	+3.99%	40,000
State of Utah	890,627	+1.75%	1,059,273	+2.57%	1,150,200
Mountain States[b]	6,855,060	+1.91%	8,281,562	+3.29%	9,200,000
United States	179,323,175	+1.26%	203,211,926	+0.99%	209,844,000

[a] Beaver, Garfield, Iron, Kane, and Washington counties.

[b] Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada.

[c] Figures not available.

Characteristics. The population of Beaver County is generally older than the population in the rest of the state with fewer residents under age 18 and more over age 65. At the time of the 1970 census, Beaver County registered 1.2 percent minorities. In contrast to the state as a whole, Beaver County has more males than females and a smaller average number of persons per household (U.S. Bureau of the Census, 1971).

The median age in Iron County is lower than the state median age (although there are relatively fewer people under age 18 and more over 65), because of the enrollment at Southern Utah State College in Cedar City. In 1970, Iron County had 1.1 percent minorities. As in Beaver County, males outnumber females, and the average number of persons per household is below the state average (U.S. Bureau of the Census, 1971). Table 2-21 details these population characteristics.

Migration. Both Beaver and Iron counties have had a pattern of outmigration, mainly attributable to young people leaving the area in search of better job opportunities. The outmigration pressure has been much less severe in Iron County, partly due to the presence of Southern Utah State College which constantly brings young people to the area. Table 2-22 reflects components of population change, comparing natural increases in population to net migration (U.S. Bureau of the Census, 1971).

Employment and economic base

Employment and trends. Approximately three-fourths of Beaver County's employment is wage and salary employment, with the remainder

Table 2-21. Demographic characteristics, 1970 (U.S. Bureau of the Census, U.S. Census of Population: 1970, General Population Characteristics, Utah, Final Report PC(1)-B46. U.S. Government Printing Office, Washington, D.C., 1971. U.S. Bureau of the Census, U.S. Census of Population: 1970, Vol. 1. U.S. Government Printing Office, Washington, D.C., 1971)

	Sex		Race				Age		
	Percent male	Percent female	Percent White	Percent Negro	Percent other	Median age	Percent under 18 yrs.	Percent 65 yrs. and over	Persons per household
Beaver County	50.5	49.5	98.8	--	1.2	29.1	37.7	11.6	3.18
Beaver div.	51.0	49.0	99.8	--	0.2	28.3	39.1	11.8	3.23
Beaver	50.0	50.0	99.9	--	0.1	27.7	39.2	12.2	3.24
Milford-Minersville div.	50.1	49.9	97.9	--	2.1	29.9	36.3	11.4	3.13
Milford	48.5	51.5	98.4	--	1.6	31.3	35.4	11.9	3.06
Iron County	50.8	49.2	98.1	0.0	1.9	22.5	37.3	7.6	3.42
Beryl-Newcastle div.	53.5	46.5	87.8	--	12.2	27.1	39.9	7.5	3.53
Cedar City div.	51.0	49.0	98.4	0.0	1.6	21.8	37.4	6.3	3.47
Cedar City	50.9	49.1	98.4	0.0	1.6	21.9	36.6	6.1	3.45
Parowan div.	48.9	51.1	99.8	0.1	0.2	30.8	36.5	14.6	3.18
Parowan	49.0	51.0	99.9	0.1	0.1	30.8	36.0	15.1	3.20
Southwestern Utah[a]	50.2	49.8	98.5	0.0	1.5	b	38.9	10.2	3.40
State of Utah	49.4	50.6	97.4	0.6	2.0	23.1	40.0	7.3	3.46
United States	48.7	51.3	87.5	11.1	1.4	28.0	34.1	9.8	3.2

[a] Beaver, Iron, Garfield, Kane, and Washington counties.

[b] Figure not available.

Table 2-22. Components of population change (U.S. Bureau of the Census, *Current Population Reports*, Series P-23 no. 7 and Series P-25 no. 461. Washington, D.C.: U.S. Government Printing Office, n.d.)

	1950-1960			1960-1970		
	Natural increase	Net migration	Net change	Natural increase	Net migration	Net change
Beaver County	955	-1,480	-525	406	-937	-531
Iron County	2,544	-1,391	1,153	1,766	-384	1,382
Southwestern Utah	7,088	-6,231	857	4,717	-1,134	3,583
State of Utah	191,660	10,105	201,765	179,604	-10,958	168,646

consisting of both farm and nonfarm proprietors. The major employment sectors, in order of magnitude, are nonfarm proprietors, state and local government, trade and farm proprietors. By far the fastest growing sector has been construction, followed by manufacturing and services. Farm employment has been decreasing (U.S. Department of Commerce, 1975).

Employment in Iron County is more diversified than in Beaver County. The largest employment sectors are trade, state and local government, followed by services, nonfarm proprietors, farm proprietors and manufacturing. The fastest growing sector is finance, insurance, and real estate, which has grown by almost 23 percent annually since 1969. Other sectors which have been expanding rapidly are: trade, transportation, communication, public utilities, and federal civilian employment (U.S. Department of Commerce, 1975). Table 2-23 compares Beaver and Iron county employment and growth to the state as a whole.

Major employers. The largest single employers in Beaver County are the Union Pacific Railroad, Beaver School District and Farwest Garments. About 100 railroad employees work in Milford, resulting in a significant contribution to the economic base. Employees of the Beaver School District work in Milford, Beaver, and Minersville; Farwest Garments is located in Beaver (Bureau of Economic and Business Research, 1975). Phillips Petroleum (geothermal exploration) and the Milford Valley Hospital are other significant employers in Milford.

The largest employer in Iron County is Southern Utah State College, followed by the Iron County School District, state and local government, Utah International, the Federal Government, Valley View Medical Center

Table 2-23. Employment by type and broad industrial sector, full and part-time wage and salary employment plus number of proprietors - Iron and Beaver counties (U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economics Information System File, April 1975)

	1969		1973		Average annual growth, 1969-73		
	Beaver County	Iron County	Beaver County	Iron County	Beaver County	Iron County	State
Proprietors	491	892	485	890	-0.31%	-0.06%	+0.56%
Farm proprietors	230	426	204	378	-2.95	-2.94	-2.97
Nonfarm proprietors	261	466	281	512	+1.86	+2.38	+2.15
Wage/salary employment	1,150	3,945	1,251	4,686	+2.13	+4.40	+4.15
Farm	91	232	64	165	-8.42	-8.17	-8.11
Nonfarm[a]	1,059	3,713	1,187	4,521	+2.89	+5.05	+4.35
Manufacturing	b	330	101	290	--	-3.18	+4.37
Mining	b	b	b	258	--	--	-0.37
Construction	26	252	51	269	+18.34	+1.65	+13.59
Transportation, communication and public utilities	167	181	b	233	--	+6.52	+2.44
Trade	244	861	251	1,243	+0.71	+9.61	+5.93
Finance, insurance and real estate	b	109	b	246	--	+22.57	+6.74
Government	286	1,238	309	1,444	+1.95	+3.92	+1.76
Federal civilian	51	157	47	200	-2.02	+6.24	-0.85
Military	0	30	0	31	--	+0.82	+4.08
State and local	235	1,051	262	1,213	+2.76	+3.65	+3.35
Services	152	453	b	536	--	+4.30	+5.02
Other	0	b	0	2	--	--	+14.26
Total employment	1,641	4,837	1,736	5,576	+1.42	+3.62	+3.77

[a] Primary source for private nonfarm employment (excludes government) = ES-202 covered employment, Utah Department of Employment Security.

[b] Not shown to avoid disclosure of confidential information. Data are included in totals.

and the Coleman Company. Most of this employment occurs in Cedar City, but a proportionate amount of state and local government work, including school employment, occurs in Parowan (Bureau of Economic and Business Research, 1975).

Seasonality and unemployment. Employment in Beaver County is at an annual low in November and increases by almost 20 percent to a high in July. This cycle differs from the cycle occurring in the state as a whole, which is at a high level in the fall, reflecting growth concurrent with the Christmas shopping season. Beaver County's cycle reflects agriculture more than trade and services. Unemployment has been lower than the state average since 1971, and Beaver County's average unemployment of 5.5 percent for 1974 was 0.6 percent lower than that for the state (Utah Department of Employment Security, 1974 and 1975).

Iron County employment grows from a low in February to a high in October, with total employment growing by 12 percent over this period. This is similar to the state pattern. Iron County's unemployment of 4.6 percent for 1974 was 1.5 percent lower than that of the state (Utah Department of Employment Security, 1974 and 1975).

Income

Total personal income. The sectors which contribute most to the income of Beaver County are: transportation, communication and public utilities (22 percent); farms (19 percent); state and local government (15 percent); wholesale and retail trade (12 percent). The sectors which have experienced the largest annual growth since 1970 have been contract construction (+31 percent), farms (+15 percent), wholesale and retail trade (+12 percent), and state and local government (+10 percent) (U.S. Department of Commerce, 1975).

Total personal income in Beaver County has grown by more than 12 percent annually since 1970, which compares with an 11 percent annual growth rate experienced by the state. Per capita income in Beaver County ranks twentieth among Utah's 29 counties, but has grown by 8 percent annually since 1970 (U.S. Department of Commerce, 1975).

The sectors which produce the most income in Iron County are state and local government (19 percent), wholesale and retail trade (19 percent), and the farm sector (15 percent). The sectors in which income has grown the fastest since 1970 are finance, insurance, and real estate (+31 percent), contract construction (+24 percent), and farming (+23 percent) (U.S. Department of Commerce, 1975).

Iron County's total personal income has grown by almost 13 percent annually since 1970, faster than the state and Beaver County (table 2-24). Per capita income in Iron County ranks 11th among the 29 counties. Annual growth of 9 percent is slightly higher than growth in the state over the same period (U.S. Department of Commerce, 1975). Table 2-25 indicates total personal income by major source for Beaver and Iron counties, plus comparisons with the state.

Income distribution. At the time of the 1970 census (U.S. Bureau of the Census, 1972), the median family income in Beaver County was approximately $2,000 lower than the state figure. More than 37 percent of the families earned less than $6,000 annually and less than 9 percent

Table 2-24. Total personal income, Beaver and Iron counties (U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economics Information System File, April 1975)

	1970		1973		Average annual growth, 1970-73		
	Beaver County	Iron County	Beaver County	Iron County	Beaver County	Iron County	State
	(thousands of dollars)						
Labor and proprietors' income[a]	$7,565	$27,254	$10,665	$39,267	+12.1%	+12.9%	+11.2%
Less personal contribution for social insurance[a]	-329	-1,145	-482	-1,896	+13.6	+18.3	+17.6
Residence adjustment[b]	-78	441	-111	653	+12.5	+14.0	+15.8
Property income[c]	1,313	4,575	1,643	6,345	+7.8	+11.5	+8.1
Transfer payments[c]	1,642	3,324	2,545	5,254	+15.7	+16.5	+16.2
Total personal income[c]	10,113	34,449	14,260	49,622	+12.1	+12.9	+11.1
Per capita income[c]	2,627	2,801	3,561	3,618	+10.7	+8.9	$4,096/+8.3

[a] By place of work.

[b] This figure is negative when people work in the county but live elsewhere, and positive when people live in the county and work elsewhere. This adjustment makes the figures comparable in terms of residence.

[c] By place of residence.

Table 2-25. Income by source, Beaver and Iron counties (U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economics Information System File, April 1975)

	1970		1973		Average annual growth, 1970-73		
	Beaver County	Iron County	Beaver County	Iron County	Beaver County	Iron County	State
	(thousands of dollars)						
By type							
Wage/salary disbursements	$5,313	$20,353	$7,332	$28,070	+11.3%	+11.3%	+10.9%
Other labor income	281	1,006	389	1,378	+11.5	+11.1	+14.2
Proprietors' income	1,971	5,895	2,944	9,819	+14.3	+18.5	+12.5
Farm	1,172	2,652	1,878	5,402	+17.0	+26.8	+23.1
Nonfarm	799	3,243	1,066	4,417	+10.1	+10.8	+8.8
By industry							
Farm	1,360	3,135	2,065	5,877	+14.9	+23.3	+19.4
Nonfarm	6,205	24,119	8,600	33,390	+11.5	+11.5	+11.0
Manufacturing	288	1,655	334	1,852	+5.1	+3.8	+10.9
Mining	a	a	a	2,903	--	--	+5.9
Contract construction	291	1,528	649	2,876	+30.7	+23.5	+22.6
Wholesale and retail trade	882	5,357	1,233	7,272	+11.8	+10.7	+11.3
Finance, insurance and real estate	a	655	a	1,479	--	+31.2	+12.0
Transportation, communication and public utilities	1,777	1,682	2,374	2,350	--	+11.8	+11.5
Services	579	3,133	a	4,334	+10.1	+11.4	+11.5
Government	1,623	7,590	2,112	10,272	+9.2	+10.6	+8.4
Federal, civilian	357	1,646	422	2,267	+5.7	+11.3	+5.8
Federal, military	56	455	72	579	+8.7	+8.4	+14.2
State and local	1,210	5,489	1,618	7,426	+10.2	+10.6	+10.3
Other industries	62	a	73	52	+5.6	--	+14.6
Total labor and proprietors' income[b]	7,565	27,254	10,665	39,267	+12.1	+12.9	+11.2

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[a] Not shown to avoid disclosure of individual firm information or for items $50,000 or less. Data are not included in totals.

[b] Total labor and proprietors' income is the total of either income "by type" or income "by industry."

earned over $12,000. Nineteen percent of Beaver County families earned less than a poverty level income (mean income of $1,648); however, only 60 percent of these poverty level families were receiving public assistance income.

Iron County's median family income of $8,084 was about $1,200 less than the state median family income. Almost one-third of Iron County families received less than $6,000 annually; about 20 percent earned $12,000 or more. Only 10 percent of the county's families were below poverty level, but 13 percent received some public assistance income (U.S. Bureau of the Census, 1972). Table 2-26 shows income distribution and poverty status of families.

Infrastructures

Transportation

Airports, air service. Municipal airports are located in Cedar City, Parowan, Beryl Junction, Beaver, and Milford. There are no private airports in either county. Scheduled airline service by Skywest Airlines is available in Milford and Cedar City, but flights are more frequent at the Cedar City airport (Bureau of Economic and Business Research, 1975). A major airline, Hughes Airwest, services Cedar City, but has requested that they be allowed to discontinue service because the demand is insufficient to justify the operation.

Rail service. Basic freight service is available via Union Pacific Railroad at either Milford or Cedar City. No passenger service is offered (Bureau of Economic and Business Research, 1975).

Table 2-26. Income distribution and poverty status, 1969 (U.S. Bureau of the Census, U.S. Census of Population: 1970, Utah: General Social and Economic Characteristics. Washington, D.C., U.S. Government Printing Office, 1972)

	Beaver County	Iron County	State of Utah
Number of families	1,042	2,914	249,741
Median income	$7,289	$8,084	$9,320
Percent having income:			
Less than $6,000	37.3	30.8	24.2
$6,000 to $11,999	43.6	48.5	45.2
$12,000 to $24,999	17.5	20.2	27.4
$25,000 and over	1.6	0.5	3.3
Income less than poverty level:			
Number of families	202	288	22,802
Mean family income	$1,648	$1,942	$1,970
Percent receiving public assistance	11.1	13.2	20.9

Major highways. Major highway transportation systems are shown in figure 2-21. Interstate Highway 15 is the most heavily traveled highway entering and leaving the geographic area of concern, with an average of more than 3,500 vehicles a day traveling this route. State Highway 21 would be the major access route to the project site. The average traffic flow on Highway 21 is about 75 vehicles per day. Average traffic within Milford is approximately 2,325 vehicles per day (Utah Department of Transportation, 1975).

Communications. Mountain Bell serves all of Beaver County and eastern Iron County. South Central Utah Telephone Assocation serves western Iron County (Bureau of Economic and Business Research, 1975).

The local Mountain Bell manager stated that the firm could add about 100 new telephone hookups to the existing system in Milford. Additional equipment in the central office would be required at Milford to expand services beyond that level.

Public utilities

Water. The adequacy of municipal water systems varies greatly among the communities of Beaver and Iron counties. The quality of the water is not presently a problem in any of the communities, but the capability to handle the present population is limited by inadequate storage facilities and distribution systems.

Milford's present water supply exceeds demand and the distribution system is adequate, but the storage capacity is too small for the present population. An additional 60,000 gallon capacity is required for water storage. Improvements on Milford's distribution system have recently been completed and the new lines could handle a greatly increased population.

Beaver has more than adequate water from its supply sources but lacks storage capacity. In order to have adequate storage for the present population, an additional 308,000 gallons would be required.

Minersville has recently completed improvements to their water system. A new well was dug which doubled their water sources. Storage and distribution are adequate.

Cedar City is facing a problem of inadequate water supply for future growth. Supply and storage facilities are adequate for the present population, although the distribution system is somewhat inadequate.

Table 2-27 shows water system specifications for each community and compares them to a standard for efficient operation. The sources of information for this narrative are the same as those given in the table.

Sewage disposal. Milford and Beaver each have lagoons for sewage treatment. Milford's recently completed system could handle 676 more persons with the existing system, and could be expanded to handle 5,000 people. Beaver's system (also new), could handle about 800 additional persons. Minersville depends entirely on septic tanks. This situation has caused some problems and is inadequate for the present population. Minersville has applied to the Four Corners Regional Commission for facility planning funds and is currently trying to find funding support for a collection and outfall system. Cedar City has a new tertiary treatment facility with a capacity for 19,000 population. Table 2-28 shows the specifications of each sewage system (Bureau of Economic and Business Research, 1975).

Other utilities. Milford and Minersville are supplied with electricity by Utah Power and Light. According to Utah Power and Light engineers, the existing facilities are operating at maximum capacity. Any substantial population increase in the Milford area would require a new line from Beaver. California-Pacific Utilities supplies electricity to Cedar City, and Beaver receives electricity from the Bureau of Reclamation. Neither county is supplied with natural gas.

Table 2-27. Water system specifications

	Sources[a]		Storage[b]		Distribution[b]	
	(Gallons per day per connection)	(Excess capacity number of connections available[c])	(Gallons of capacity per connection)	(Excess capacity number of connections available[c])	(Gallons per minute per connection)	(Excess capacity number of connections available[c])
Guidelines[d]	1,600	--	800	--	2.0	--
Milford	8,064	+1,576	650	-73	4.3	+880
Beaver	4,773	+1,309	333	-385	e	--
Minersville	8,060	+540	1,119	+187	2.2	+147
Cedar City	1,400	-386	1,783	+6,876	1.8	-309

[a] Combined flows available to each community were derived from information from the Utah State Department of Social Services, Health Division.

[b] Storage and distribution capacities were derived from Bureau of Economic and Business Research, Community Profiles (City and County Economic Facts), University of Utah, Salt Lake City, Utah, 1975.

[c] Excess capacity, either negative or positive is stated in terms of new connections that could be added and still meet the guidelines. A connection is estimated as serving 3.5 persons.

[d] Guidelines are estimates for efficient system operation from the Health Division.

[e] Not available.

Table 2-28. Sewage systems specifications (Bureau of Economic and Business Research, Community Profiles (City and County Economic Facts), University of Utah, Salt Lake City, Utah, 1975)

City	Plant	Capacity MGD[a]	Capacity Population	Capacity for additional population	Average daily flow - MGD[a]
Beaver	Lagoon	.256	2,400	+800	.145
Milford	Lagoon	b	2,000	+676	b
Minersville	Septic tanks	--	--	--	--
Cedar City	Tertiary	2.7	9,000	+10,000	1.5

[a] Million gallons per day.
[b] No discharge.

Education. Beaver and Iron counties each comprise an entire school district. Beaver County enrollments have been fluctuating in recent years, and were at a 5-year low for the 1975-76 enrollments (Utah Foundation, 1976). Table 2-29 reflects school statistics. Educational facilities appear to be adequate to meet the needs of the present population. The Beaver School District Superintendent estimates that county school facilities are currently operating at about 50 percent of capacity (Lewis and Associates, 1974).

Table 2-29. Public school statistics (Utah Foundation, *Statistical Review of Government in Utah*, 1976 Edition, Salt Lake City, Utah, March 1976)

	Beaver School District	Iron School District
Fall enrollments:		
1975-76	974	3,475
1974-75	1,020	3,461
1973-74	1,000	3,276
1970-71	1,083	3,248
Average daily attendance, 1974-75	963	3,252
Pupil-teacher ratio, 1974-75	20.5	23.3
Expenditures per pupil, 1974-75:		
current expense[a]	$1,169	$885
capital outlay	$357	$182
TOTAL	$1,526	$1,067

[a] Includes interest payments for short-term loans and bonded debt. Does not include school lunch program, redemption of school bonds and other debt payments into sinking fund, and public school expenditures for community services, summer schools, and other special education programs.

Enrollments in Iron County had been rising faster than the state average until the 1975-76 school year. The Iron School District Superintendent estimates that schools are operating at about 80 percent of capacity (Lewis and Associates, 1974).

Public safety. Beaver County has four full-time law officers, Beaver City has three policemen, Milford has two, and Minersville has one. Iron County has five full-time law officers, Cedar City has 11 policemen, and five more are located in other Iron County communities (Bureau of Economic and Business Research, 1975). Both counties are part of the Utah Highway Patrol Division 7 (Utah Highway Patrol, 1975), with headquarters in Cedar City. One lieutenant, two sergeants and 14 troopers cover Beaver, Iron, Washington, Piute, Garfield, and Kane counties. One highway patrolman lives in Milford, two live in Beaver, one resides in Parowan and two are located in Cedar City. This gives Beaver County 3.1 law enforcement personnel per each 1,000 population, which is a high level of protection. Iron County has 1.7 law enforcement personnel per each 1,000 population, which is higher than the state average of 1.0.

Beaver County has a volunteer fire department and provides joint fire protection to Milford, Beaver, and Minersville. Milford, Minersville and Beaver also have volunteer fire departments. Milford has had a recent history of arson incidents. Fire insurance classifications within the cities are high, and outlying areas are usually given the maximum rating. Iron County has a volunteer fire department providing joint fire protection with Cedar City and Parowan. Cedar City has a full-time fire department. Fire insurance classifications are lower in Cedar City, and at the maximum rate for the rest of the county (Bureau of Economic and Business Research, 1975).

Primary medical care. The physician-population, hospital bed-population, and dentist-population ratios in table 2-30 indicate the availability of health care in the two counties as well as a comparison with state figures. Iron County has a higher physician-population ratio than is characteristic of nonmetropolitan Utah, while the ratio in Beaver County is lower. Milford Valley Memorial Hospital is currently operating at an efficient 60 to 80 percent utilization. The hospital also cares for 20 long-term patients. Beaver Valley Hospital has been somewhat over utilized recently; plans are under way for a ten-bed enlargement. Doctors, dentists and hospitals are located in Beaver, Milford, and Cedar City. There is a total of 118 hospital beds in these communities.

Housing. Table 2-31 indicates residential building activities in the larger communities. The low per unit values in some instances reflect the number of multiple-dwelling units built in some years.

The housing market is not strong in Milford; only a few homes, mostly older, are usually for sale. The market for component and pre-fabricated homes is increasing, and is the main source of new construction. There are a few mobile homes, but limited hookup facilities restrict expansion of this market. In 1970, 72 percent of Milford houses were owner occupied, 16 percent were renter occupied, and the remainder were vacant (U.S. Bureau of the Census, 1971).

Table 2-30. Licensed physicians, hospital beds and licensed dentists per 1,000 population, 1975

	Physicians[a] per 1,000 population	Hospital beds[b] per 1,000 population	Dentists[a] per 1,000 population
Beaver County	.48	10.95	.71
Iron County	.83	5.00	.69
State of Utah[c]	1.30	1.74	.48

[a] Physicians and dentists listed in Yellow Pages, excluding those dentists in a practice restricted to a specialty.

[b] Refers to short-term general hospitals only. Excludes specialty, federal, long-term and institutional hospitals.

[c] 1971 information. These data were compiled from "Utah Health Facts," prepared for the Utah Center for Health Statistics, State Division of Health.

Table 2-31. New residential housing (Bureau of Economic and Business Research, Construction Report, University of Utah, various issues)

	1975	1974	1973	1972
Beaver				
No. Units	48	24	38	21
Value	$1,253,300	$ 618,800	$ 724,100	$ 390,100
Milford				
No. Units	4	6	4	16
Value	113,000	128,500	79,000	234,400
Cedar City				
No. Units	105	76	169	189
Value	2,811,000	2,047,000	3,489,000	2,504,700
Parowan				
No. Units	21	29	26	22
Value	439,000	558,000	430,000	306,300

The housing situation is stronger in Beaver, which has significantly more construction activity than Milford, although the two towns are similar in size. In 1970, houses in Beaver were 72 percent owner occupied, 15 percent renter occupied and the remainder were vacant (U.S. Bureau of the Census, 1971).

Cedar City has the strongest housing situation, with more houses for sale, plus the ability to handle more rapid expansion of the housing market. In 1970, Cedar City houses were 76 percent owner occupied, 21 percent renter occupied, and 3 percent vacant (U.S. Bureau of the Census, 1971).

Government and taxation

Organization of different levels of government. Elected officials of each county consist of three commissioners, and one each clerk, sheriff, attorney, treasurer, assessor, recorder, auditor and surveyor. The commissioners act as both executive and legislative branches of the county government, and each commissioner is responsible for administration of several departments. The county seat of Beaver County is Beaver City; the county seat of Iron County is Parowan.

The Five County Association of Governments, encompassing Beaver, Garfield, Iron, Kane, and Washington counties, is one of seven multi-county planning districts in the state based on social and economic interrelationships. This association, with headquarters in St. George, administers and coordinates federal and state development projects. Iron County recently withdrew from membership in the organization.

Milford, Minersville, Beaver, Cedar City, Parowan, Paragonah, Enoch, and Kanarraville are the incorporated cities and towns within Beaver and Iron counties. All of these communities operate with a mayor-council form of government.

Two additional units of government exist in Beaver County. County Service Area No. 2 provides revenue for Milford Valley Memorial Hospital and the South Milford Fire District offers fire protection (Utah Foundation, 1975).

Taxation, revenue, and bonding. The 1975 assessed valuation of all property in Beaver County was $12,748,179 and $31,156,205 in Iron County. Property taxes charged for the year were $794,825 and $2,427,419 respectively. In Beaver County, 69 percent of the revenue went to schools, 17 percent to the county, 10 percent to cities and towns, and 5 percent to special districts. Schools in Iron County received 64 percent of property taxes, with 25 percent to the county, and 11 percent to municipalities (no special districts), (Utah Foundation, 1976). Table 2-32 shows current bonded indebtedness for the communities of concern.

Quality of life. Many components determine the "quality of life" in a particular area, but there is no specific way in which they can be measured. The degree of community homogeneity, how people perceive their environment, and the kinds and availability of goods and services are some indicators of quality of life which will be discussed in this section.

Community homogeneity. The communities of Beaver and Iron counties contain a high degree of ethnic, religious, and cultural homogeneity.

Table 2-32. Total bonded indebtedness December 1975 (Data from city and county officials)

Beaver County	$ 365,000
Beaver	504,000
Milford	8,000
Iron County	500,000
Cedar City	1,500,000

As of 1970, 91 percent of Beaver County residents were native (United States born) Americans of native parentage. The remainder, either foreign born or native born of foreign or mixed parentage, were mainly British, German, or persons of Spanish language. Eighty-three percent of the 1970 population also lived in Beaver County in 1965. In Iron County, 92 percent of the population in 1970 was native of native parentage. The foreign stock consisted mainly of persons of Spanish language, British, Mexican, and German extraction. Sixty percent of the population had lived in Iron County at least 5 years prior to the 1970 census (Bureau of the Census, 1972).

The Latter-Day Saints Church provides both religious and cultural background for its members. Although Mormonism is the dominant religious force in the area, Milford and Cedar City add some religious and cultural diversity (Lewis and Associates, 1974). Baptist, Methodist, Catholic, and Seventh Day Adventist churches are active in Milford, while Beaver has only a Community Church in addition to Mormon Churches. Cedar City has a Church of Christ, Assembly of God, Catholic, Presbyterian, and Mormon churches (Bureau of Economic and Business Research, 1975).

Public attitudes. According to a recent statewide survey dealing with the attitudes of people toward their communities, Beaver and Iron county residents are quite satisfied with their communities (Lewis and Associates, 1974). Table 2-33 summarizes the feelings of community satisfaction felt by residents of the Southwestern Planning District.

Table 2-33. Satisfaction with community as a place to live (Lewis and Associates, *Alunite: A Socio-Economic Study*, Logan, Utah, 1974)

	Number	Percent
Not at all satisfied	1	.64
Not very much satisfied	4	2.55
Pretty much satisfied	42	26.75
Very much satisfied	110	70.06

According to an earlier community survey, conducted in three Utah counties including Beaver County, respondents were asked what they felt were major advantages and disadvantages of living where they did (Lewis and Associates, 1974). Table 2-34 presents the most frequently mentioned responses of Beaver County residents.

Table 2-35 reflects the willingness of Beaver County residents to pay increased taxes for various kinds of services.

Table 2-34. Major advantages and disadvantages of living in your community (Lewis and Associates, Alunite: A Socio-Economic Study, Logan, Utah, 1974)

Most frequently mentioned in order of rank	Advantages	Disadvantages
1	Access to out-of-doors and wide open spaces	Availability of good jobs for young people
2	Good place to raise a family	Availability of good shopping facilities
3	Friendliness of the people	Opportunities for cultural refinement
4	Absence of a polluted environment	Opportunities for earning a livable income

Table 2-35. Percentage of persons willing to pay increased taxes for selected services[a] (Lewis and Associates, Alunite: A Socio-Economic Study, Logan, Utah, 1974)

	Beaver County[b]	
	Yes	No
To provide better health and medical service	63.9%	35.6%
To improve schools and other educational facilities	62.2	36.7
To provide more jobs for local residents	63.9	35.6
To develop local industry	63.3	35.0
To improve recreational opportunities	53.3	46.1
To upgrade law enforcement	51.1	47.8
To train local government officials	48.3	51.1
To provide better housing	56.7	42.8
To help clean up pollution	46.1	52.2
To help provide opportunities for cultural refinement	56.7	42.8

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[a] Question: "Below is a list of services which frequently require taxes to support and maintain: Would you be willing to pay more taxes for these services if you knew the money would be spent in this area?"

[b] Numbers do not always total 100 percent because of a small number of non-responses to some of the items.

Availability of goods and services. Beaver County is somewhat limited in the kinds of resources and facilities available to residents. A park, swimming pool, and tennis courts provide recreation in Milford; Beaver also has these facilities plus a golf course and theater. Both cities have fraternal and service clubs. Recreational sites within close proximity are Minersville State Park, Bryce Canyon National Park, Fishlake National Forest, Piute State Park, and Capitol Reef National Park (Bureau of Economic and Business Research, 1975).

Beaver has 69 retail and 6 wholesale stores, while Milford has 19 retail and no wholesale stores. Beaver has 237 hotel and motel rooms; Milford has 88. Each city has one bank and several general contractors. Beaver also has facilities for electric motor repair and a sheet metal shop (Bureau of Economic and Business Research, 1975).

Cedar City has a park, swimming pool, tennis courts, theater, golf course, and service/fraternal/social organizations. Area recreation sites are much the same as for Beaver County. In addition Dixie National Forest and Zion National Park are close to Cedar City (Bureau of Economic and Business Research, 1975).

Cedar City has 373 hotel and motel rooms, 166 retail and 23 wholesale establishments (Bureau of Economic and Business Research, 1975). Three banks and two savings and loan associations are located in Cedar City. Cedar City also offers tool and die service, electric motor repair, and a sheet metal shop (Bureau of Economic and Business Research, 1975).

LAND USE PLANS AND CONTROLS

Federal agencies. A planning system has been implemented by BLM to ensure multiple use administration of national resource lands. A Unit Resource Analysis (URA) and Management Framework Plan (MFP) were developed for the Wah Wah Planning Unit in 1973 and the Beaver Planning Unit in 1975. The URA provides an inventory of all resources in the unit and includes management recommendations for the full development of each resource. The MFP resolves any conflicts in the development of individual resources and provides a framework for making management decisions. The proposed alunite project was considered in the Wah Wah Unit MFP. Management decisions in the MFP which deal with the proposed alunite project are summarized below:

1. Investigate possible sites for an alunite processing plant. Select sites which will minimize conflict with other resource values and prepare environmental analysis on plant site alternatives in connection with mineral lease applications.

2. Encourage the exploration of the alunite deposits. Issue mineral leases, rights-of-way, and other authorizations necessary for mining, milling, utilities, transportation, and water development after analysis is made, as required by the National Environmental Policy Act of 1969, and only if resource damages can be minimized to an acceptable level.

The complete planning documents for the Beaver and Wah Wah Planning Units are on file at the Cedar City BLM District Office.

The U.S. Forest Service and National Park Service have completed, or are in the process of completing, land use plans for management units that may be affected by the increased population associated with mineral and energy development in southwestern Utah. These plans are based on projected increases in visitor use from all sources.

State of Utah. The state has no land use plans for state-owned lands in the region. State controls for the use of water resources are discussed in the Hydrology section of this chapter, and recreation development is discussed in the Land Use section.

Local. Beaver County has adopted a master plan which establishes basic priorities for future land uses. This master plan and the existing zoning and subdivision ordinances were developed before the alunite project was proposed and are primarily concerned with the orderly development of residential areas with a lesser emphasis on remote or rural areas. An April 1974 amendment to the zoning regulations changed the zoning classification of western Beaver County from outlying to grazing. County officials feel this will provide more control over mineral development and related facilities such as trailer parks and subdivisions. Under this classification, each home site must include 10 acres of land. County officials are attempting to amend zoning and subdivision ordinances to facilitate the rapid growth that would result from the alunite project.

In Beaver County, the communities of Milford, Beaver, and Minersville have master plans that were adopted prior to any knowledge of the proposed alunite development. Milford recently adopted amended zoning, subdivision.

and street ordinances designed to facilitate anticipated growth from the alunite project.

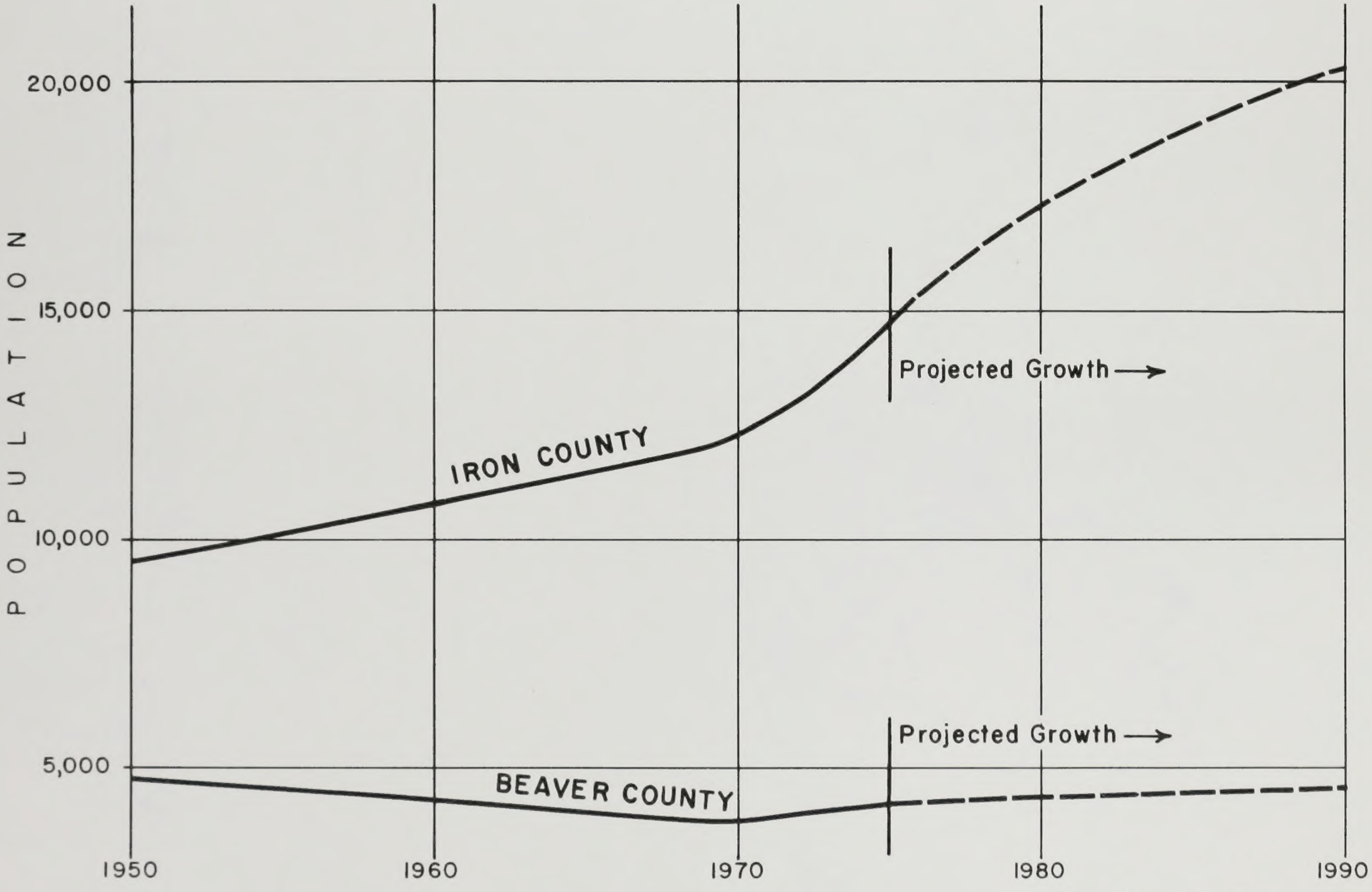
Iron County has a master plan primarily concerned with development of residential areas. County zoning regulations have been in effect since 1962 and were recently amended to provide for regulation of subdivisions in undeveloped and unincorporated areas of the county. Most undeveloped land in Iron County is zoned for recreation/forestry which permits a wide variety of land uses. The county master plan has not been amended to facilitate population growth from the proposed alunite project. Cedar City officials are in the process of amending the master plan to facilitate growth resulting from development of energy and mineral resources in southwestern Utah.

FUTURE ENVIRONMENT WITHOUT PROJECT

The probable future environment is discussed here with reference to the area that would be directly affected by the alunite project. This area includes Beaver and Iron counties.

The proposed project site and Wah Wah Valley would continue to be used for livestock grazing. Recreational activities such as deer hunting, rock collecting, harvesting woodland products, and general sightseeing would continue at a low level. Air quality would remain high except for occasional dust storms. Livestock would make limited use of the ephemeral streams and springs and no significant use would be made of the Wah Wah Valley ground water reservoir. All cultural resources in the area of concern would be subject to natural deterioration and, particularly in the Blawn Wash area, susceptible to vandalism. Prospecting and mineral exploration work would continue at a relatively high level. Such activity could result in development proposals similar to the alunite project.

The economy of Milford would continue to be based on transportation and agriculture, and growth from these sectors would not be significant. However, because of the possibility of other mineral development in western Beaver County, Milford and Minersville could experience periods of rapid growth followed by population declines as mineral projects are initiated or phased out. Beaver would continue to show a slight growth as a result of increases in outdoor recreation and tourism. Cedar City would probably continue to grow at a relatively high rate because of its position as a regional center for agriculture, transportation, government, and industry. No significant changes in the present quality of life would occur. Figure 2-22 indicates population projections for Beaver and Iron counties.



Source: Office of the State Planning Coordinator, Division of Technical Services, unpublished data (UPED & UPLAND models)

Figure 2-22
POPULATION GROWTH
BEAVER AND IRON COUNTIES

CHAPTER 3

THE PROBABLE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

CHAPTER 3

THE PROBABLE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

INTRODUCTION

This chapter describes and evaluates the probable environmental impacts of the proposed alunite development which would significantly affect the quality of the human environment. Both regional and site specific environmental impacts are discussed.

The analysis of impacts presented is designed to be commensurate with the expected magnitude, intensity, duration and incidence of impacts. Special consideration is given to environmental components protected by law and other environmental aspects considered to be of particular importance to man and his environment.

The ultimate significance of an impact depends upon its influence on the human environment, human activities, and human values. Therefore, the analysis of each impact has been traced from the proposed action to man and his environment. This requires following impacts from one environmental component to another until the ultimate significance of an impact has been evaluated. For example, the removal of vegetation during construction of the proposed project could eventually cause an adverse impact on recreation. The section on Vegetation contains an analysis of the direct impacts of vegetation removal. It also notes that removal of this vegetation would affect wildlife. The section on

Wildlife contains the analysis of how vegetation removal would impact wildlife and their habitat. It also notes that these impacts would affect recreation. The recreation portion of the Land use section then contains the analysis of impacts on recreation where the ultimate significance of the impact on man or his environment is evaluated.

CLIMATE

No measurable impact on climate is anticipated from the proposed alunite project.

AIR QUALITY

Impacts of the proposed alunite project on air quality in the surrounding area are viewed in terms of state and federal air quality and emission standards, potential effects on plant and animal life and human health, and possible effects on the visual qualities of Wah Wah Valley. The impact of any pollutant on animals, vegetation, and man is determined by its concentration in the ambient air as well as length of time over which exposure occurs. Air quality standards, therefore, take into account exposures over a long term as well as over short terms of a day or less. Estimated pollution levels include calculation of expected annual average concentrations as well as maximum expected 24-hour or 3-hour averaged concentrations.

During the construction phase, air quality would be affected during high winds by fugitive dust from the disturbed soil. Operation of construction vehicles and equipment and the operations of a 20-megawatt diesel powered generation plant would result in atmospheric emissions of hydrocarbons, carbon monoxide, and nitrogen oxides in small quantities during the 42-month construction phase. However, governmental air quality standards for these emissions are not expected to be exceeded at any time.

Stack emissions. Significant emissions from the proposed processing plant that would affect air quality in the area of concern defined in Chapter 2 include sulfur dioxide, nitrogen oxides, fluorides, particulates, and ammonia. Emissions from various processes would be subject to the EPA Standards of Performance for New Stationary Sources. These emission standards are compared with estimated emissions in table 3-1. Emissions for the power plant are based on use of worst grade coal, 90 percent removal efficiency of sulfur dioxide, and 99 percent removal of particulates as proposed by the Alumet Company. Fluorides would have to be controlled with a 99.5 percent efficiency in order for EPA emission standards to be met.

The State of Utah requires a minimum of 85 percent control of particulate emissions for all process units or systems emitting 100 tons or more of particulates annually (assuming no pollution control) and for all coal-fired steam electric power generating units (State of Utah Air Conservation Regulations, revised July 9, 1975). Visible emissions from new installations are not allowed to exceed an opacity of 20 percent (or

Table 3-1. Estimated emissions and applicable federal standards of performance for new stationary sources for various processes in Alunite processing plant (Environmental Protection Agency, Standards of Performance for New Stationary Sources, Federal Register, Vol. 36, No. 247, December 23, 1971, and Volume 40, Number 152, August 6, 1975)

Source	Unabated emissions	Proposed control percent	Abated emission	Federal emission standard	Percent of emission standard
Power plant					
Sulfur dioxide	2.45 lb/l x 10^6 Btu	90	0.245 lb/l x 10^6 Btu	1.2 lb/l x 10^6 Btu	20.4
NO_x	0.68 lb/l x 10^6 Btu	20	0.54 lb/l x 10^6 Btu	0.70 lb/l x 10^6 Btu	77.1
Particulates	9.0 lb/l x 10^6 Btu	99	0.09 lb/l x 10^6 Btu	0.09 lb/l x 10^6 Btu	100.0
Sulfuric acid plant					
Sulfur dioxide	4.0 lb/ton produced	80	0.8 lb/ton produced	4.0 lb/ton produced	20.0
Phosphoric acid plant					
Fluorides	4.4 lb/ton P_2O_5 feed	99.5	0.02 lb/ton P_2O_5 feed	0.02 lb/ton P_2O_5 feed	100.0
Diammonium phosphate plant					
Fluorides	12.0 lb/ton P_2O_5 feed	99.5	0.06 lb/ton P_2O_5 feed	0.06 lb/ton P_2O_5 feed	100.0
Triple Superphosphate plant					
Fluorides	40.0 lb/ton P_2O_5 feed	99.5	0.2 lb/ton P_2O_5 feed	0.2 lb/ton P_2O_5 feed	100.0
Granular triple superphosphate storage					
Fluorides	0.02 lb/hr/ton of equivalent P_2O_5 stored	99.5	1.0 X 10^4 lb/hr/ton of equivalent P_2O_5 stored	5.0 X 10^4 lb/hr/ton of equivalent P_2O_5 stored	20.0

an equivalent of a No. 1 density on the Ringelmann Chart). Utah regulations further require that coal used in any combustion process contain no more than 1.0 percent sulfur by weight, or if worse grade coal is burned controls be used such that sulfur dioxide emissions would not exceed that which would be produced under the above limitations.

The measures to reduce impacts on air quality which are part of the applicant's proposal have been described in Chapter 1. Expected control efficiencies for the different components at the main processing plant are summarized in table 3-2.

Particulates can be controlled with baghouse filtering systems with efficiencies up to 99.6 percent. Efficiency depends on particle size and mesh size of the filter. Filters are most effective for the larger size particles. Cyclones are effective generally for the larger size particles. Electrostatic precipitators are most effective in capturing smaller particles down to the submicron range and efficiencies generally range from 97 to 99.5 percent. Electrostatic precipitators on large power plants such as the Navajo plant have operated 97 percent of the time (operating availability). Malfunctions of the three boilers which would require shutdown and restarting would increase the particulate emissions, since precipitators operate only when boiler operation is more than 20 percent of capacity. The amount of additional emissions would depend on the operating availability. Data on the projected operating availability of the precipitators proposed for the alunite processing complex are not available, but it is anticipated that operating availability would be essentially the same as for large power

Table 3-2. Summary of emissions, control efficiencies and control devices for proposed alunite main processing complex

	Emissions pounds per day		Control efficiency (percentage)	Control device
	Unabated	Abated		
Alunite primary crushing, conveying and storage				
Particulates	7,000	1,400	80	Settling, water sprays
Alunite fine grinding, crushing, handling				
Particulates	183,000	700	99.6	Baghouse
Alunite dehydration and oxidation				
Particulates	384,000	3,800	99	Scrubber
SO_2	566,000	22,800	96	Lime scrubber
NO_x	21,000	17,000	20	Scrubber
Sulfuric acid plant				
SO_2	12,000	2,400	80	Lime scrubber
Potassium sulfate				
Particulates	52,000	350	99.6	Baghouse
Alumina calcining				
Particulates	50,000	500	99	Scrubber, baghouse
SO_2	16,000	3,200	80	Lime scrubber
NO_x	6,000	4,800	20	Scrubber
Alumina storage and shipping				
Particulates	60,000	250	99.6	Baghouse
Phosphate rock handling storage, grinding				
Particulates	136,000	550	99.6	Baghouse
Phosphoric acid plant				
Fluorides[b]	4,400	20	99.5	Cross flow scrubber
GTSP/MAP/DAP plant				
Particulates[a]	312,000	1,550	99.5	Cross flow scrubber
Fluorides[b]	88,000	400	99.5	Cross flow scrubber
Ammonia	8,400	400	95	Acid scrubber
Aluminum fluoride				
Particulates[a]	300	3	99	Cross flow scrubber
Fluorides[b]	3,200	32	99	Cross flow scrubber
Aluminum fluoride storage and shipping				
Particulates[b]	62,000	250	99.6	Baghouse
Power plant				
Particulates	350,000	3,500	99	Scrubber, electrostatic precipitator
SO_2	95,000	9,500	90	Lime scrubber
NO_x	30,000	21,000	30	Scrubber

[a] Includes particulate fluorides

[b] Includes particulate and gaseous fluorides

plants. During periods of equipment breakdown or restarting procedures, federal and state emission standards and ambient air quality standards for particulates could be exceeded. State air quality regulations allow for periodic increases in emission rates caused by unavoidable equipment breakdown.

With present best available technology wet lime scrubbers can attain a sulfur dioxide removal efficiency of 90 percent. The scrubbers would not be operating at full capacity during shutdown or warmup operations or during times of equipment failure and emission rates would increase. Operating availability of lime scrubbers used on power plants varies from 80 percent to almost 100 percent (EPA, 1974). Technology has improved over the last few years and much of the equipment presently being installed performs with at least a 90 percent availability.

Control of nitrogen oxides with present technology is about 20 percent. The applicant proposes to minimize nitrogen oxide emissions by using approved fire boxes and boilers.

Fluoride emissions can be controlled using a combination of packed scrubbers, venturi scrubbers, and dry cyclones with efficiencies of up to about 99.5 percent. The applicant would have to control fluoride emissions with a 99.5 percent efficiency to comply with the federal emission standards applicable to phosphate fertilizer plants.

The Utah Air Conservation Regulations require that in case of pollution control equipment failure or malfunction, the company submit a written report to the state concerning the nature of the event and an estimate of emission quantities. If the incident should be judged to be unacceptable, the company would be subject to penalties provided in the law and/or an order to curtail or cease operations until the situation is rectified (Utah Air Conservation Regulations, Revised July 9, 1975, Sections 2.2.6(b) and 2.5.3).

In addition to the emissions listed, there could be formation of secondary contaminants resulting from chemical interaction among different pollutants emitted from the main processing complex or reactions with chemicals from natural sources. In the presence of sunlight, sulfur dioxide (SO_2) could oxidize to sulfur trioxide (SO_3); or react with water vapor to produce sulfuric acid. Ammonia emitted from the phosphate fertilizer plant could react with sulfuric acid to form ammonium sulfate. Other sulfates could result from reactions between sulfuric acid and various metal oxides. The sulfates are very fine particles and would have the potential for remaining suspended in the atmosphere for an extended period of time. Under the action of sunlight, nitrogen dioxide could break down into nitric oxide and dissociated oxygen which, in turn would react with molecular oxygen to form ozone (O_3). The dissociated oxygen could also act to oxidize sulfur dioxide to sulfur trioxide. These secondary pollutants, would not cause a significant increase in ground level particulates. However, any secondary pollutants formed would be likely to consist of fine particles having a potential for causing visibility reductions.

Pollution dispersion modeling. Calculation of estimated pollutant concentrations from the proposed alunite development for comparison with federal standards was accomplished using computerized simulation modeling. Pollutant concentration at a certain point at a given time is dependent on a complex interaction of a great many variables including emission rate, height and diameter of stack, temperature at which gas leaves the stack, distance from the source as well as meteorological factors such as wind speed and direction, atmospheric stability, mixing height, and ambient air temperature. In addition, there is the complicated effect of topography on local winds and turbulence that affect plume dispersion. Computer modeling is the only practical method to estimate pollutant concentrations. Annual average concentrations were determined using climatological averages; maximum 24-hourly and 3-hourly average concentrations were determined using worst case dispersion conditions.

Pollution concentrations were calculated by EPA and Utah Bureau of Air Quality using the EPA C9M3D model. The C9M3D model assumes a uniform wind field, a normal, or Gaussian distribution of pollutants in the vertical, and utilizes the concept of averaging about a 22.5 degree angular segment. Topography is taken into account by allowing the plume centerline to approach to within but never less than 10 meters vertical distance from the terrain surface for stable atmosphere (EPA, 1975). The results are summarized in table 3-3. The area is presently classified Class II under the Prevention of Significant Deterioration Regulations. Concentrations would not meet the Class II standards. The Utah Bureau of Air Quality has submitted a proposal to redesignate the area from

Table 3-3. Maximum calculated ground level pollution concentrations (micrograms per cubic meter) from Alunite stack emissions

	Calculated	Class II	Class III[a]
Sulfur dioxide			
Annual	78	15	80
Maximum 24-hour	290	100	365
Maximum 3-hour	1,160	700	1,300
Particulates			
Annual	29	10	60
Maximum 24-hour	76	30	150
Nitrogen oxides			
Annual	88	--	100
Fluorides			
Annual	1.0	--	--
Maximum 24-hour	2.7	--	--

[a] Utah Bureau of Air Quality proposes Class III designation for area. Class III allows deterioration up to the ambient air quality standard.

Class II to Class III. If the area were to be redesignated, the proposed alunite plant would meet Class III standards. However, it is seen that calculated values are very close to the limits allowed. Therefore, ambient standards could be exceeded during pollution control equipment breakdown. The maximum pollution concentrations would occur over the elevated terrain about 2 to 3 miles southwest of the proposed plant site. The high concentrations are caused by periods of northeasterly winds backing the plume against the Wah Wah Mountains.

Calculations using the C9M30 model indicate that for particulates and sulfur dioxide the air quality standards for potential Class I areas would not be violated.

Potential impacts of fluoride emissions. Fluoride emissions would be mainly in the form of gaseous silicon tetrafluoride (SiF_4) or silicon difluoride (Si_2F_6) from the phosphoric acid plant; gaseous hydrogen fluoride (HF) from the granular triple superphosphate and aluminum fluoride plants; and particulate aluminum fluoride ($A\ell F_3$) from the aluminum fluoride plant. Gaseous fluorides are absorbed rapidly by vegetation, whereas particulate fluorides that collect on plant surfaces are absorbed only when dissolved by moisture. Fluoride compounds tend to accumulate in vegetation and over the long term can lead to concentrations capable of serious damage to plants and animals. Potentially toxic fluoride accumulation has been demonstrated in birds and mammals that feed on plants in the vicinity of pollution sources.

The effect of fluorides on vegetation has been discussed by Groth III (1975): "Concentrations as low as one part per billion (ppb) in ambient air are capable of causing serious damage to vegetation and may threaten livestock. Levels of fluoride air pollution capable of accumulating and damaging sensitive plants have occurred several miles downwind from emission sources, despite air pollution controls." Toxicity thresholds vary greatly with different plant species and animals. Damage to vegetation is often in the form of "tip burn" in which the tips and edges of leaves exhibit a brown discoloration, which if it occurs extensively enough may retard plant growth. It has been determined that ambient fluoride concentrations between 0.1 and 1 ppb averaged over several months cause damage to certain sensitive plants (Hill, 1969). Certain trees such as Douglas fir and many species of pine are particularly sensitive to fluorides (Prival and Fisher, 1973).

Livestock have been found to be especially vulnerable to fluoride pollution. Fluorides accumulate in the bones which can lead to skeletal deformities (fluorosis) and consequential adverse health effects. Cattle have been found to become susceptible to fluorosis if fluoride concentrations in the diet exceed 40 ppm (Prival and Fisher, 1973).

Adverse effects on humans have been studied mainly in terms of occupational exposure. The American Conference of Governmental Hygienists has set a threshold limit value of 3 ppm (3,000 ppb) for hydrogen fluoride gas in industrial work places (based on a 40-hour work week). Threshold levels applied to the general population would tend to be lower, but would still be far higher than ambient air concentrations that have been measured near major fluoride sources.

There are neither Federal nor State of Utah ambient air quality standards for fluorides. The State of Washington has established an ambient air quality standard of 0.5 $\mu g/m^3$ for the growing season and 2.9 $\mu g/m^3$ for a maximum 24-hour average. The State of Montana has a 24-hour average standard of 0.82 $\mu g/m^3$ (1 $\mu g/m^3$ is approximately 1.25 ppb).

The maximum calculated 24-hour average fluoride concentration is 2.7 $\mu g/m^3$. The maximum calculated annual average concentration is 1.0 $\mu g/m^3$, which occurred over the mountains to the west and south of the proposed alunite site. Calculated concentrations in Wah Wah Valley are less because of the relatively lower elevation.

Ozone. Ozone has a very important role in the chemical transformation of many pollutants. Although ozone has traditionally been thought to be associated with urban "photo chemical smog", recent studies have indicated that high ozone levels may exist in rural areas. The mechanism producing these high rural levels is not entirely clear.

It has been observed by David et al., (1974) and Williams (1975) that ozone is being depleted for some distance downwind of large pollution sources such as coal-fired power plants. It is believed the ozone is consumed in chemical reactions leading to the transformation of nitric oxide (NO) to nitrogen dioxide (NO_2). Large pollution sources may lead to ozone formation at great downwind distances. No background measurements at the proposed alunite plant site are available. Measurements at other rural locations occasionally exceed ambient air quality standards. Since the ozone problem is not well understood, no definite statement can be made about the potential impact of the proposed alunite plant on ambient ozone concentrations.

Fugitive dust. The potential problem of fugitive dusts generated by mining operations and the tailings ponds during the 25-year operation phase is difficult to evaluate quantitatively. The amount of dust raised from these sources depends on wind speed, particle size, the amount of moisture present and effectiveness of control practices. In addition, the problem is compounded because of high background dust concentrations during strong wind conditions. Therefore, fugitive dust during strong wind conditions, especially after a prolonged absence of precipitation, could result in particulate levels exceeding federal ambient air quality standards in the immediate vicinity of the mine and tailings ponds.

Visibility. Visibility reductions would be caused primarily through increased particulate loading in the atmosphere due to emissions from the processing plant as well as dust generated by the mining area and tailings ponds.

Possible impact on visibility may also result from conversion of SO_2 to SO_3 and sulfates. Under conditions of high humidity and the presence of the necessary catalysts, conversion rate of sulfur dioxide to sulfuric acid near the stack exit is about 1.5 percent per hour according to findings by Wayne (1973). Photochemical processes may, under bright sunshine, account for another 0.1 to 0.3 percent per hour. Conversion rates would decrease rapidly with increasing distance from the stack due to dilution. A study of the effect of air borne particles including those resulting from SO_2 conversion was done by Bechtel Corporation (1974) for the proposed Kaiparowits power project. The Bechtel model calculations showed reductions in visibility from a background visual range of 70 miles down to a minimum of 50 miles depending on location and direction of view. Estimated emissions of particulates and sulfur dioxide from the proposed Kaiparowits plant are about 2 to 3 times those estimated from the proposed alunite project. Reduction of visual range for the proposed alunite project would, therefore, not be as great.

Nitrogen dioxide (NO_2), when present in sufficient concentrations in the atmosphere, causes a brownish discoloration in the sky. Nitrogen dioxide results from the oxidation of nitric oxides (NO), which constitute the bulk of the NO_x emissions from combustion operations. The rate of NO_2 formation is dependent on intensity of sunlight, presence of ozone or hydrocarbons, and total concentration of NO. At nitric oxide concentrations of 400 ppm, (which may occur very close to the stack exit) the rate of conversion would be approximately 0.8 percent per minute according to Leighton (1961). However, conversion rates would be reduced drastically at increased distances downwind of the stack due to dilution of the plume. An examination of the various expected nitrogen oxides source strengths and the associated rate of formation of NO_2, assuming the above rate relationship under various limiting dispersion conditions, indicates that rate of formation of NO_2 is not expected to be rapid enough to produce brown discoloration.

No significant impact would be expected from a slight reduction in visibility that may be associated with stack emissions from the proposed alunite operation. Potential reduction in visibility would be confined mainly to Wah Wah Valley. The impacts of reduced visibility on the landscape character are discussed in the section on Aesthetics.

Fugitive dust emissions from the mine and tailings ponds could create a very significant visibility reduction, although it would generally be confined to the vicinity of those sites during periods of high winds.

Emissions of water vapor from the cooling tower would form a visible cloud at times when temperatures are low and relative humidity high. Even under the most adverse conditions, however, the visible cloud would be very localized. Possible icing conditions could exist in wintertime, but these would again be highly localized.

Odor. The emissions from the processing plant, particularly sulfur oxides compounds, would have an unpleasant odor. Odor threshold levels for sulfur dioxide are listed as 0.5 to 0.7 ppm for more sensitive persons and 0.8 to 1 ppm for the average person (National Air Pollution Control Administration Publication, April 1975).

Odor from SO_2 would therefore not be noticeable anywhere during average meteorological conditions. Odor may be noticeable during short periods of extreme limited mixing or fumigation within a few miles radius from the processing plant complex. Nitrogen dioxide odor threshold levels range from approximately 0.12 ppm to 0.5 ppm. It is not expected that maximum expected ground level concentrations would be sufficient to cause a noticeable odor. Threshold levels for ammonia as listed by the Manufacturing Chemists Association range from approximately 21 ppm to 47 ppm. Maximum ground level ammonia concentrations would not be expected to exceed the threshold levels for most persons.

Summary. Modeling calculations indicate that the proposed alunite project would not meet Class II standards for sulfur dioxide and particulates. The proposed plant would meet Class III standards if the area were designated in the future. Maximum calculated fluoride levels slightly exceed concentrations that could affect sensitive plants or cause fluorosis in grazing animals over the long-term. The highest fluoride concentrations would occur about 2 to 3 miles southwest of the proposed site. This area is about 5 square miles in size and because of the steepness of the terrain, receives very little wildlife use and almost no use by grazing livestock. Based on the available data, long-term fluoride concentrations would not be biologically significant in Wah Wah Valley.

TOPOGRAPHY

The prominent ridge at the proposed alunite mine site would be changed by mining activities. Removal of 100 million tons of ore and 82 million tons of waste rock material from the mine area would gradually remove the prominent ridge and eventually produce a pit approximately 240 acres in size. This ridge would be leveled from the present maximum elevation of about 7,600 feet to an average elevation of 7,300 feet by the tenth year of mining. From the 10th to the 25th year of mining the ridge would continue to be lowered, and a pit would develop leaving a depression at an elevation of 6,940 feet. The maximum pit depth would be 450 feet.

For the first 20 years the 82 million tons of waste rock generated by the mining operation would be dumped into the dry canyon north of the mine and west of the mine service area. The cumulative effect of this disposal would raise the canyon floor about 400 feet over a length of 1.5 miles to eventually create a plateau with an elevation of about 7,400 feet. This waste rock pile would occupy 175 acres after 25 years of mining. After the 20th year of mining, Alumet proposes to dump much of the waste rock into the pit at the east end of the mine area. This would fill in about 38 acres of the 240-acre pit and would create a small hill with an elevation of 7,520 feet.

Changes to topographic features would result from leveling areas within the processing plant complex to facilitate construction and from initial construction of 40-foot high dikes to contain the tailings ponds. Dikes around the gypsum and silica tailings ponds would be approximately 5 miles in length and would eventually reach heights of 80 and 120 feet. These ponds would cover a total of 1,250 acres.

Minor changes to topographic features would occur as a result of leveling areas prior to construction of the transportation system, ore conveyor system, and communication facilities. Shallow depressions or pits up to 10-feet deep would result from the mining of sand, gravel, and basalt.

The changes in topographic features that would result from the proposed action would change the visual appearance of southern Wah Wah Valley. These visual impacts and their significance are discussed in the Aesthetics section of this chapter. Impacts to water resources that would result from changes in topography are discussed in the Hydrology section.

GEOLOGY

The proposed action would not result in any environmental impacts to geologic structures.

HYDROLOGY

Ground water

Water quantity and use. It is estimated that less than 1,000 acre-feet of water from the Wah Wah Valley ground water reservoir would be used for the total construction period of the project.

Approximately 32 acre-feet of water per year would be withdrawn from bedrock aquifers in the Wah Wah Mountains to operate the alunite mine and related facilities. Withdrawing water for the mining operation would have a small, unmeasurable impact on the water supply. However, the 32 acre-feet per year withdrawn for the mining operation would be unavailable for other uses during the 25-year life of the project. Withdrawal of 32 acre-feet per year through the mine supply wells would reduce the natural ground water recharge to the valley ground water reservoir by about the same amount. This would result in approximately a 0.4 percent reduction in the annual estimated recharge (8,500 acre-feet) to the valley ground water reservoir.

Approximately 7,590 acre-feet of water per year would be used to operate the processing plant complex and related facilities. The water would be pumped from 10 to 20 wells tapping the Wah Wah Valley ground water reservoir. This water would be unavailable for other uses that might develop during the 25-year life of the proposed project. The withdrawal of 7,590 acre-feet per year of water from the Wah Wah Valley ground water reservoir would not exceed its estimated annual rate of recharge.

Part of this withdrawal would be offset by increased recharge in the mine and silica sand tailings pond areas. It is likely that the open pit mine, an area of 240 acres by the end of the 25th year of operation, would increase recharge to bedrock aquifers by impounding surface runoff that would ultimately drain to the valley ground water reservoir. This drainage is estimated to be 100 acre-feet per year. Some seepage loss would result from the silica sand tailings pond (675 acres) and would also eventually reach the Wah Wah Valley ground water reservoir. There are insufficient data available to accurately determine the annual rate of artificial recharge from this seepage loss. A rough approximation can be made by the extrapolation from an estimate of seepage from the Kennecott Copper Corporation tailings pond near the Great Salt Lake. Hydrostatic heads in the Kennecott Copper Corporation pond are greater than they would be in the silica sand pond, but the permeability of the floor of the silica sand pond and the tailings would be greater than they are in the Kennecott Copper Corporation pond. Analog computer model studies of the valley ground water reservoir in Salt Lake County indicate that the ground water recharge from the Kennecott Copper tailings pond is about 2,400 acre-feet per year (Hely, et al., 1971). This amount is about 0.44 acre-feet per year per pond acre. Using this factor for the silica tailings pond, the rate of ground water recharge from that pond would be about 300 acre-feet per year. It is unlikely that there would be any seepage losses from the gypsum tailings pond (575 acres) because of the chemical and physical nature of the gypsum tailings. Therefore, increased artificial recharge, as a result of the proposed project, would be on the order of 400 acre-feet annually (from the alunite mine and the silica sand tailings pond).

The partial dewatering of the valley ground water reservoir would result in rearrangement and compaction of the sands and gravels that comprise the ground water reservoir. Associated adjustment from this compaction would occur upward through the overlying unsaturated valley fill deposits. Because of the great thickness (several hundred to more than 1,000 feet) of unsaturated rocks available to absorb such adjustments, land subsidence probably would be too small to measure or cause structural problems.

All springs in Wah Wah Valley discharge from bedrock aquifers that are several hundred to more than 1,000 feet higher than the valley fill aquifers which would be tapped by the proposed project wells. Therefore, it is unlikely that the yields of any of the springs, including Wah Wah Springs, would be affected by pumping for the proposed project supply wells. It is not likely that there is direct hydrologic connection between aquifers in the proposed mine area and Wah Wah Springs (Stephens, 1974) and the proposed alunite mine is not expected to affect the flow from Wah Wah Springs.

The proposed project would increase the total population in the Milford-Minersville-Beaver-Cedar City area by an estimated 4,500 people. This would increase total water supply requirements by an estimated 940,000 gallons per day (about 1,058 acre-feet per year), and total sewage loads by an estimated 470,000 gallons per day (approximately 530 acre-feet per year). These estimates are based on factors used by the Utah Division of Health to evaluate municipal water supply and waste-water treatment requirements. The city of Milford would receive most of the anticipated new residents, and would require the largest expansion of water supply and waste-water treatment facilities. The significance and projected expansion of municipal water supplies and waste water treatment facilities are discussed in the Socioeconomic section. Ground water is available to accommodate the anticipated expansion but the expansion would increase the present mining of the ground water reservoir in the Milford area by approximately 1,000 acre-feet per year. The annual rate of withdrawal is estimated by the State Engineer to exceed the recharge rate by 10,000 acre-feet. The additional water use would increase the present mining rate of water 10 percent. At the present mining rate, it would take about 200 years to withdraw the water stored in the top 100 feet of the ground water reservoir (see Hydrology section of Chapter 2). The increased mining rate would shorten this period to about 180 years. One thousand acre-feet of water would support approximately 250 acres of irrigated cropland producing a gross agricultural income of $60,000 per year. This income would be lost if water was purchased from existing agricultural users.

Water quality. Construction activities would not affect ground water quality. All impacts to ground water quality would result from operation of the processing plant complex and alunite mine. The mine would become an area of natural ground water recharge. Minerals in the mine area are generally insoluble and occur abundantly in the Wah Wah Mountains. Recharge from the mine area would not cause water quality problems. The waste rock pile would be composed of rock from the mine which also contains minerals that are generally insoluble. Water percolating through the waste rock pile would have the same physical and chemical characteristics as water from the surrounding undisturbed terrain.

Physical characteristics of the tailings that would accumulate in the gypsum tailings pond indicate that they would be poorly permeable to essentially impermeable. Therefore, seepage from the gypsum tailings pond, and the effect on ground water quality would be negligible.

It is estimated that about 300 acre-feet per year of fluid would seep from the silica sand tailings pond to the underlying valley ground water reservoir. Nearly all solid tailings that would accumulate in the silica sand tailings pond would consist of relatively insoluble silica (about 93 percent), alumina and iron oxide. It is unlikely that fluid seeping through those tailings to the valley ground water reservoir would dissolve sufficient amounts of these materials to significantly raise concentrations of these chemical compounds or their disassociative ions in the ground water.

The slurry solution that would enter the silica sand tailings pond would contain about 12 percent potassium sulfate, 5 percent sodium sulfate and 0.33 percent sodium hydroxide. Given these constituents, the slurry solution would have a salinity of about 17.3 percent total dissolved solids. It is assumed that roughly the same percentages of these compounds would occur in the fluid that would seep from the pond to the valley ground water reservoir. These percentages would decrease considerably as fluids seeping from the pond (about 300 acre-feet per year) mix with natural ground water recharge in the general area (several thousand acre-feet per year) and ground water in storage (more than 1 million acre-feet). Therefore, no significant decrease in ground water quality is anticipated.

Some seepage loss from the sewage lagoons probably would occur. The amount cannot be estimated from available data, but probably would be only a few acre-feet per year. Some of this fluid would eventually enter the Wah Wah Valley ground water reservoir. By the time it would reach the nearest well, about 3 miles away, the fluid would have undergone considerable purification by filtration in the sand and gravel.

The sanitary landfill for solid waste disposal would be in an area that receives about 10 inches of precipitation per year. There would be little, if any, precipitation that would seep completely through the fill to dissolve contaminants and carry them to the underlying ground water.

It is concluded from the foregoing discussion that there would be no serious degradation of the quality of ground water in the Wah Wah Valley ground water reservoir as a result of the proposed project. Should serious contamination of the ground water occur, however, it would occur in that part of the reservoir that would be tapped by the proposed project supply wells. The contaminated water would be continually pumped and recycled through the project water supply system (and presumably would be treated as required) during the life of the project; none would migrate down the valley to affect the water supply from the BLM Wah Wah well or other wells that may be drilled in that area.

Seepage from the silica sand tailings pond to the Wah Wah Valley ground water reservoir probably would continue for several years after the 25-year life of the proposed project. Because of the large ground water withdrawals for the project, a large cone of depression would have developed on the water table in the vicinity of the well field. The fluids seeping from the silica sand tailings pond would be contained in this cone of depression for a number of years as water levels recovered and the natural ground water gradients to the lower end of the valley became reestablished. By this time, enough natural recharge (about 8,500 acre-feet a year) would have occurred to dilute the contaminants and return the ground water quality to near its natural level.

The increased population in Milford would increase the amount of raw sewage that could enter the ground water system during periodic breakdowns or in the event that sewage treatment facilities are unable to handle the increased sewage loads. Raw sewage would enter shallow, relatively poor quality ground water that flows to the north and is consumed by evapotranspiration along the Beaver River bottoms. It is unlikely that any of the raw sewage would seep to the deep aquifers that are tapped by the culinary water wells or other wells in the Milford area. These wells are up-gradient from the sewage treatment facility with respect to the direction of ground water movement; also the aquifers tapped by the culinary and agricultural wells are overlain by more than 100 feet of alluvial deposits which serve as natural filters. It should be noted that raw sewage was continuously discharged over the shallow ground water system northwest of Milford prior to the completion of the existing treatment facility. This discharge had no adverse effect on the ground water or ground water uses.

The increased populations in Minersville and Cedar City would also increase the potential for seepage of raw sewage into the ground water system. The ultimate impact on ground water quality probably would be no greater than presently occurs with existing treatment facilities. Improperly treated sewage is currently being discharged and no problems with water quality have developed. As in the case of the Milford area, aquifers tapped by wells in the Minersville and Cedar City area are overlain by alluvial deposits which serve as natural filters. These deposits would effectively filter raw sewage before it reached the aquifers tapped by culinary and agricultural wells. The Beaver City sewage treatment facility has excess capacity to handle the relatively small increase in sewage loads that would occur, and no additional impact on water quality is anticipated.

Surface water

Water quantity and use. It is expected there would be no significant impact on surface water quantity and use in Wah Wah Valley and the Milford area during the 42-month construction phase. Environmental impacts would occur primarily in Wah Wah Valley during the 25-year operation of the mine and processing plant.

During the operation phase, impoundment of surface runoff in the pit area of the alunite mine and within the dikes of the tailings ponds would decrease annual runoff in Wah Wah Valley. The relatively impermeable surface of roads, railroads, parking areas, buildings, and processing plant facilities would increase surface runoff. Table 3-4 shows the estimated effect of the proposed project on the mean annual runoff in Wah Wah Valley and the Milford area. The net change would be a reduction of 104 acre-feet per year in Wah Wah Valley and an additional 2 acre-feet per year in the Milford area. These changes represent about 1.4 percent of the annual surface runoff in Wah Wah Valley and 0.05 percent of the annual surface runoff in the Milford area. The effect on surface runoff would be negligible.

Table 3-4. Estimated mean annual surface runoff (maximum after 25 years of operation) anticipated from the proposed project

Project component	Approximate number acres that would be occupied	Present annual runoff from unoccupied area acre-feet/yr	Percent present runoff is of total annual runoff in region	Change in runoff in occupied area acre-feet/yr	Percent change in mean annual runoff from region
			Wah Wah Valley (total mean annual runoff 7,800 acre-feet)		
Alunite mine	240	14	0.18	-14	-0.18
Tailings ponds	2,340[a]	94	1.20	-94	-1.20
Surfaced roads, buildings, parking lots	200[b]	8	0.10	+ 4	+0.05
			Milford area (total mean annual runoff 30,000 acre-feet)		
Railroad spur and service road	190	4	0.02	+ 2	+0.01

[a] Includes 1,250 acres of tailings ponds and 1,090 acres of drainage area above tailings ponds.

[b] Includes paved portion of 10-mile access highway, 25 percent of 460-acre processing plant site, and proposed parking lots.

An important source of natural recharge to the Wah Wah Valley ground water reservoir is seepage of streamflow from lower Willow Creek into the underlying rocks. The mean annual runoff in Willow Creek (located about 3 miles below the proposed open pit alunite mine) is about 2,000 acre-feet. The reduction in ground water recharge resulting from retention of runoff by the alunite mine from Willow Creek would be negligible (about 14 acre-feet per year).

The proposed project site would be located in an area where cloudburst flooding often occurs. By retaining runoff, the mine and tailings ponds would tend to reduce the intensity of such floodings. The subsequent effect upon natural surface flow cannot be quantified because of a lack of data.

Water quality. Removal of vegetation and modification of the terrain during construction of the proposed project would increase sediment loads by an unknown amount in Willow and Quartz creeks during the 42-month construction period. It is unlikely that such increase would reduce the usefulness of the runoff as a source of water for livestock and wildlife, because even under natural conditions water in these intermittent streams carries a relatively high sediment load because of high-intensity storms that provide the stream flow. Sediment loads, both natural and induced by surface disturbance, would clog the stream beds and impede stream bed infiltration of runoff. This stream bed infiltration is an important source of natural recharge to the valley ground water reservoir and stream bed infiltration of water from Willow Creek could be reduced. The resulting reduction of ground water recharge induced by the project cannot be determined from available data. The best estimate is that it would reduce recharge to the valley ground water reservoir by less than 1 percent of the total annual recharge.

Operation of the proposed project would create the potential for accidental spills of toxic material into the intermittent streams. Livestock and wildlife using water from these streams could be poisoned. This impact would be localized because of the intermittent nature of the streams and an accurate estimate of impacts to animals cannot be made.

The sewage lagoon (4 acres) and solid waste disposal areas (40 acres) would be located away from main drainages; therefore, they would not contribute to lowered surface water quality.

SOILS

Construction activities and operation of the proposed project would result in the mixing, compacting, and burial of topsoil on 2,409 acres over the 25-year life of the project. Fuel or chemical spills could sterilize soil on specific sites where they occur.

During the 42-month construction period, clearing of vegetation and operation of trucks and heavy construction equipment would result in soil disturbance on approximately 744 acres. Mechanical disturbance of soil would cause changes in the soil structure and the onsite distribution of microorganisms, minerals, and nutrients. Vehicle and heavy equipment use on cleared areas during the summer when soils are dry would pulverize the surface making it more susceptible to wind and water erosion and creating a source of fugitive dust. Similar traffic over wet soils during the winter, spring, and fall would cause severe compaction and rutting on construction sites and roads. Compaction of soils would result in a long-term loss of vegetative productivity and a reduction in the ability of the surface soil to absorb precipitation. Rutting would create new channels for the surface flow of water and would increase the possibility of soil erosion from cleared areas.

Soil loss by wind and water erosion would occur at the rate of 0.001 to 0.010 inch per year over the entire surface of the disturbed areas according to estimated accelerated erosion rates for bare soil in the National Resource Inventory, Beaver River Basin Study. The 0.010-inch per year rate would apply in areas with steep slopes because of increased velocity of surface runoff. The lower erosion rate would apply to the flatter areas. Soil from both wind and water erosion would accumulate in Wah Wah Valley since the valley is surrounded by mountains which would prevent significant quantities of airborne soil from leaving the valley and there is no surface water drainage from the valley. The displaced soil would be spread over a very large area and would not accumulate in sufficient amounts to cause damage to vegetation. Localized effects from increased sediment loads in the intermittent Willow and Quartz creeks are discussed in the Hydrology section of this chapter. All of the 744 acres that would be disturbed during construction are located in areas where precipitation is too low or soil conditions are unsuitable for artificial revegetation to be successful. Because of these limiting factors, vegetative cover would have to be reestablished through natural succession and accelerated soil erosion would continue for up to 20 years after construction. Assuming that the highest erosion rate (0.010 inch per year) would occur for a period of 5 years, then 0.05 inch of soil would be lost from the 744 acres disturbed during construction. This loss is essentially the same as the high natural erosion rate and would not have a significant effect on the ability of the soil to support native vegetation.

During the 25-year operation of the project the mine area would gradually enlarge to 240 acres, the mine waste rock pile would enlarge to 175 acres, and the tailings ponds would enlarge to 1,250 acres. Thus, after 25 years of operation, there would be a total of 2,409 acres affected. Soil on the 240-acre mine area would be removed and buried under waste rock, and soils beneath the 175-acre waste rock pile would be permanently buried. Erosion would not occur because the mine area would be exposed bedrock and the waste rock pile would be composed of almost all solid rock material. Wind erosion from the surface of the tailings ponds would occur at a rate anticipated to be equivalent to the unprotected and disturbed soil rate (0.010 inch per year). This soil would be dispersed over a large area and would not affect the vegetative productivity of the soil. During periods of high wind velocity, fugitive dust from the tailings ponds would have an adverse impact on air quality (particulate levels) and would reduce visibility in Wah Wah Valley. The velocity and duration of winds that would create large quantities of fugitive dust from the tailings ponds have not been determined. However, based on field observations of wind conditions in Wah Wah Valley, it is estimated that fugitive dust would be produced from the surface of the tailings ponds on an average of 10 days a month.

At the end of the project approximately 573 acres would be permanently devoid of productive soil. This figure includes 158 acres that would be occupied by physical structures and 415 acres that would be covered by the alunite mine and spoil pile. The cumulative soil erosion loss from the 2,409 acres disturbed or buried over the project life cannot be determined with any degree of accuracy. However, an erosion rate of 0.010 inch per year over the entire 2,409 acres would result in a loss of 50.2 acre-feet of soil during the 25-year project life. The actual soil loss would be much lower because part of this acreage would be gradually disturbed over the 25-year life of the project; part would be occupied by structures and roads, and unoccupied areas disturbed during construction would be in various stages of vegetative reestablishment. It should be noted that none of the soil lost by erosion would find its way into perennial streams or rivers and the amount of displaced soil accumulating in Wah Wah Valley would not adversely affect vegetation or other resource values.

The increased population associated with the project would result in an increase in off-road vehicle use which could increase soil disturbance around the communities of Milford, Minersville, Beaver, and Cedar City. This additional soil disturbance would increase the adverse visual impacts resulting from scarring of hills and would increase the potential for gully erosion resulting from concentrated off-road vehicle use of steep terrain. This additional impact would only have localized significance.

The disturbance, burial, and removal of soil would result in increased levels of fugitive dust, changes in physical appearance, loss of vegetation, and loss of livestock forage and wildlife habitat. Further discussions of these impacts and their significance are contained in the sections on Air quality, Vegetation, Wildlife, Aesthetics, and Land use.

VEGETATION

Over a 25-year period of time, construction and operation of the proposed project would result in the eventual removal of 2,409 acres of vegetation. After construction, 131 acres (water pipelines and construction material sites) would be put back into production. These acreages are shown by vegetation community and project component in Table 3-5.

Vegetation removal would occur throughout the 42-month construction period. During this time, construction of the processing plant complex, water system, transportation system, ore conveyor system, communication facilities, material sites, and mine buildings would require removal of 744 acres of vegetation. This removal would consist of 717 acres in the mixed shrub-grass community, 20 acres in the shadscale community and 7 acres in the pinyon-juniper community.

During the 25-year operation of the processing plant, an additional 1,665 acres of vegetation would be affected. The silica sand and gypsum tailings ponds and the solid waste disposal area would be gradually enlarged, requiring the removal or burial of an additional 1,250 acres

Table 3-5. Acres of vegetation which would be removed including permanent loss[a] - communities listed by vegetative community and project component

Project components	Mixed shrub-grass community	Pinyon-juniper community	Revegetated community	Shadscale community
Alunite mine	19 (5)	453 (400)	15 (15)	--
Processing plant complex	1,504 153	--	--	--
Water system	66	--	--	--
Transportation system	260	--	--	20
Construction materials	65	--	--	--
Communication facilities	--	7	--	--
Total removal	1,914	460	15	20
Total permanent loss	(158)	(400)	(15)	--

[a] Permanent loss figures indicated by parentheses

of the mixed shrub-grass community. Stripping of overburden and the mining of alunite ore would cause the removal of 415 acres of pinyon-juniper at the mine site. This would occur over the 25-year period proposed for mine development and expansion.

Of the total 2,409 acres of vegetation removed, 573 acres (including 400 acres of pinyon-juniper, 158 acres of mixed shrub-grass and 15 acres of revegetated communities) would be permanently lost. The 573 acres include 158 acres which would be occupied by physical structures and 415 acres which would be covered by the alunite mine and waste rock pile.

The area of the mine and spoil pile would be considered a permanent loss for growing vegetation because it would be left in either a bedrock condition or a waste pile of rock. The remaining 1,836 acres of the mixed shrub-grass, pinyon-juniper and shadscale communities would not be permanently occupied by physical structures.

The combined 1,776 acres of unoccupied areas in the mixed shrub-grass and shadscale communities would likely be invaded by halogeton and rabbitbrush. Halogeton is an annual weed poisonous to livestock, particularly sheep. These areas contain soil conditions favorable for the growth of halogeton. Rabbitbrush has limited forage value for livestock or wildlife. The unoccupied areas within the pinyon-juniper and revegetated communities would be reinvaded by a variety of native weeds and shrubs, none of which would be poisonous to livestock.

An intensive survey of the proposed project site was completed by BLM during the summer of 1975 (after the flowering season) and no threatened or endangered plant species were found.

Increased populations in Milford, Minersville, Beaver, and Cedar City would result in greater use of adjacent lands by off-road vehicle (ORV) users. The extent of this additional use and area which would be disturbed by these users cannot be predicted. In these areas, concentrated and continual ORV use during the presence of the increased population would crush vegetation and eventually result in the loss of forbs and grasses. Woody plants such as sagebrush and pinyon-juniper trees would likely survive such ORV use.

The significance of impacts to vegetation can be evaluated by the relationship of each vegetative community that would be disturbed to the total amount of this vegetative type in Wah Wah Valley. The 1,914 acres of the mixed shrub-grass community and the 460 acres of the pinyon-juniper community that would be disturbed represent approximately 1 percent of the total acreage of these communities in the valley and surrounding mountains. The 15 acres of the revegetated community and the 20 acres of the shadscale community represent less than 1 percent of the total acreage in Wah Wah Valley.

The disturbance and removal of vegetation would induce localized soil erosion; cause a loss or reduction of wildlife habitat and livestock forage; and change the visual qualities of Wah Wah Valley. Artificial revegetation attempts after initial construction disturbance and at project end would probably fail. Reestablishment of the native plant cover by natural process would take 15 to 20 years. Further discussions of these impacts and their significance are contained in the sections on Soils, Wildlife, Aesthetics and Land use.

WILDLIFE AND WILD HORSES

Over a 25-year period of time, construction and operation of the proposed project would result in the eventual removal of 2,409 acres of vegetation, thereby eliminating that acreage temporarily or permanently as wildlife and wild horse habitat. This, in turn, would cause the disturbance, elimination, or dislocation of animals associated with this habitat. Table 3-6 shows the types of animals that would be disturbed, eliminated, or dislocated by each component of the proposed project.

During the 42-month construction period, rodents and reptiles would be eliminated on 774 acres where soil would be disturbed and vegetation disturbed or destroyed. Most of these animals would be affected directly by the removal of vegetation which serves as food and cover. Larger animals would abandon the area and move onto adjacent habitat as a result of human activities, noise, and loss of vegetative cover. Based on field estimates of the existing population, probably no more than 30 mule deer would have to move to similar habitat in portions of the Wah Wah Mountains situated to the north and south of the project site. Approximately 15 antelope would avoid the area and range throughout the rest of Wah Wah Valley and 29 wild horses would be forced to concentrate their use on adjacent reseeded areas and the Wah Wah Mountains south of the project site. The State Division of Wildlife Resources does not accept the validity of these figures and they are presented only to provide a rough estimate of the potential impacts to wildlife. Populations of all herbivores are low and the movement of animals onto adjacent habitat would not result in a significant loss of animals. Loss of food in the form of rodents and reptiles on the 744 acres would cause predator species (fox, coyote, bobcat, and raptors) to avoid the area. Rabbits and birds would also avoid the construction area because of the human activity and noise.

The mountain lion, preferring remote habitat, would probably move farther from human activities and disturbance than the other species.

Table 3-6 Wildlife eliminated or dislocated by each component of the proposed project

	Wildlife species eliminated (*) or dislocated (x)								
Project component	Small rodents	All reptiles	Raptors	Predators	Deer	Antelope	Wild horses	Disturbed acres	Permanently lost acres
Alunite mine	*	*	x	x	x	--	x	487	415
Processing plant complex	*	*	x	x	--	x	--	1,504	158
Water system	*	*	x	x	--	x	--	66	--
Transportation system	*	*	x	x	--	x	--	280	--
Construction materials	*	*	x	x	--	x	x	65	--
Communication facilities	*	*	x	x	x	x	x	7	--
Total acres								2,409	573

It is not anticipated that serious competition for available habitat would occur and this would not have a significant influence on the well-being of the mountain lion inhabiting the area of concern.

During the 25 years of mining activity and processing plant operation, an additional 1,665 acres of vegetation would be gradually removed or buried by enlargement of the tailings ponds, mine, and waste rock pile. As shown in table 2-14, both construction and operation activity would result in the loss of 540 acres of deer habitat, 1,914 acres of antelope habitat, and 540 acres of wild horse habitat. All these acreages represent a very small portion (less than 1 percent) of the total habitat available for those species in Wah Wah Valley and the surrounding mountains. The major impact would be to small rodents and reptiles since large herbivores and carnivorous animals could easily move to adjacent habitat. Upon abandonment of the project an estimated 573 acres of habitat would be permanently lost. Of the permanently lost habitat, 415 acres would be deer and wild horse habitat and 158 acres would be antelope habitat.

The mining operation would require the use of high explosives for blasting on a daily basis. It is possible that this would cause larger animals to move even further from the project site to escape the noise of blasting, but there is no way to determine the ultimate effect. It is also possible that animals would become accustomed to the blasting and avoid only those areas where there would be concentrated human activity.

Because of the acidic nature of the silica tailings pond and the caustic nature of the gypsum tailings pond, deer, antelope, and wild horses could be poisoned by drinking water from these ponds. These animals could also be trapped in the mud in the tailings ponds. The likelihood that wildlife would avoid these ponds because of the chemical characteristics cannot be predicted; therefore, no accurate estimate of wildlife losses can be made.

Increased vehicular traffic on the 9 miles of the paved access highway (up to 750 cars per day) and the average of 2.5 unit trains per day that would use the 20-mile railroad spur could result in potential road kills of antelope during all seasons of the year. The extent of this increased hazard to wildlife cannot be accurately predicted but it would not be expected that it would significantly affect the population since antelope are seldom involved in vehicular accidents.

Wildlife, wild horses, and livestock compete directly for forage. The temporary loss (up to 25 years) of 1,836 acres and the permanent loss of 573 acres of rangeland that would result from development of the proposed project would increase the level of competition between wildlife, wild horses, and livestock on areas immediately adjacent to the project site. Data are not available to analyze the level of such competition or subsequent effects on competing animals.

Increased hunting and poaching which would likely occur during the 42-month construction and 25-year operation phases would add to the hunting pressure which could be another factor contributing to low deer populations in Utah. The extent that this would further contribute to the low deer population is unknown. However, because of the low deer population, any further increase in harvest would be locally significant. The same impacts would occur to the antelope herd in Wah Wah Valley. An increase in hunting pressure and poaching would likely contribute to a population decline. The extent of the impact cannot be predicted because of lack of data.

The power lines and other man-made structures would provide perches for raptors in that part of Wah Wah Valley that is devoid of trees. These additional perches would improve the habitat for raptors. However, the presence of perches adjacent to heavily used roads would increase the potential for indiscriminate shooting of raptors and other large birds. Raptors could be electrocuted by perching on power transmission structures.

No typical nesting habitat or other habitat for the peregrine falcon occurs in the area of concern; therefore, no significant impact to this endangered species is anticipated.

The section on Land use contains a discussion on how impacts to wildlife would influence recreational opportunities in the area of concern. The Land use section also discusses additional impacts and their significance on livestock use in the area of concern.

CULTURAL RESOURCES

Historical resources. Construction activities and the presence of the proposed project components would cause a change in the open space setting of the historic sites in the project area. This change would induce a long-term loss of the historic setting now present in and around the charcoal kilns north of the project site, and the rock house and dugout in Blawn Wash. The impact of the possibility of increased damage to the charcoal kilns and the rock house and dugout in Blawn Wash cannot be predicted since their historic values are, at present, unknown.

On the project site, waste rock from the alunite mine would be dumped into the dry canyon where a small cabin is situated. Ultimately, this cabin would be covered, resulting in the permanent loss of any modern history associated with it.

Frisco and Newhouse are far enough away from both the project area and Milford, that neither construction or increased population would affect their present natural settings. Increased visitation may affect the sites, however, mainly due to increased chances of vandalism.

No historic sites on or eligible for nomination to the National Register of Historic Places are known to occur in the area of concern.

Archaeological resources. Construction activities would physically alter, bury, or destroy 28 existing archaeological sites on the proposed project site. Eighteen of these sites are located along the road, conveyor, etc., routes between the mine and the plant; an additional nine are located in close proximity to the mine water system or located between the conveyor and the water system. The exact nature, extent and depth (if any) of these sites has not been determined, but they are thought to range from lithic scatters to transient camping areas.

Mining and operation of the alunite mine would result in the destruction of the rockshelter. The rockshelter site has been evaluated and no significant archaeological materials were found. Construction of the ore conveyor and road between the mine and processing plant could cover, alter, or destroy 18 known surface archaeological sites. Construction of the mine water system could physically disturb or destroy up to seven archaeological sites.

Extensive field reconnaissance of the area did not reveal any archaeological sites in unsurveyed areas proposed for the processing plant, roads, the railroad spur, processing plant water system, and other support facilities.

The increased population in adjacent communities and the work force (up to 1,800 construction employees followed by 1,000 operational employees) at the project site would significantly increase the level of such activities as random hunting for arrowheads and other artifacts throughout the area of concern. In the event specific sites were located by the work force, subsequent disturbance and collection would occur. The 2-mile area adjacent to the project site would be particularly vulnerable to such activities since it is known to contain at least 50 archaeological sites. A temporary construction camp for about 900 workers would be maintained at the project site and it is likely that these residents would spend considerable time exploring the adjacent area.

This would intensify impacts to archaeological values during the life of the construction camp.

Only limited data are available on the significance or importance of archaeological sites in the area of concern. Therefore, no precise quantification can be made as to scientific values that might be lost. To identify and quantify such impacts would require further field study and evaluation. However, it should be noted that the destruction or alteration of any archaeological site, or series of sites, reduces the potential for study and interpretation of archaeological remains in association with one another in their physical surroundings. The consequence could be the impairment or loss of future opportunities for a scientific investigation of former cultures that inhabited the area. The number of sites identified during the limited survey of the project site suggests a potential for abundant and varied archaeological resources.

During construction, it is possible that buried sites not accounted for in the BYU surface survey would be encountered and badly damaged or destroyed.

No archaeological sites on or known to be eligible for nomination to the National Register of Historic Places are known to occur in the area of concern. Pursuant to the Council of Environmental Quality guidelines for preparation of environmental statements, it is not necessary to contact the Advisory Council on Historic Preservation, since no resources are involved on which they would need to comment. It is remotely possible that sites could be found, when intensive surveys are completed, that would be eligible for inclusion on the Register. Should such resources be encountered, proper procedures would be followed.

AESTHETICS

Site preparation, construction activities, and operation of the alunite mine, processing plant complex, transportation system, and water system would result in the removal of vegetation and disturbance of soils on 2,409 acres during the 25-year life of the project. Disturbance to 744 acres would occur during the 42-month construction period and would cause a change in the relatively natural appearance of the southern end of Wah Wah Valley. Colors in Wah Wah Valley are drab, land forms blend together, and there is little contrast in color or texture. The soil disturbance associated with construction of the proposed project would disrupt natural color patterns and removal of vegetation would change the texture of the land surface. These changes in natural appearance would be visible from a 15-mile portion of Utah Highway 21.

During operation of the processing plant complex there would be additional impacts to the visual qualities of Wah Wah Valley. The buildings, stacks, and other physical structures of the processing plant would occupy a 150-acre tract approximately 10 miles south of Utah Highway 21. Table 3-7 lists the number of stacks and their heights. The 23 stacks that would be 200 feet or higher would be lighted as a warning to aircraft. These lights would be highly visible from Highway 21 during the night.

Table 3-7. Number and height of processing plant stacks

Number	Height (feet)
11	460
2	400
1	300
2	260
2	230
1	210
4	200
2	160
1	130
26	

The buildings, structures, and stacks would be an obvious man-made intrusion on the valley floor. Vapor columns from cooling towers would also be visible from Highway 21. The intensity of this intrusion would be reduced by the 10-mile distance from the highway and the fact that a group of low hills forms a backdrop for the proposed processing plant. This backdrop would eliminate the skyline effect of the stacks as seen from the highway.

The tailings pond dikes would be highly visible from Highway 21 because they would be a different color and texture than the surrounding area. During the 25-year life of the project the tailings ponds would increase in size to 1,250 acres and attain heights of 80 to 120 feet, thereby increasing the visual impact. During periods of high winds, which are estimated to occur an average of 10 days per month (see Soils), it is likely that large dust clouds would be produced from the dry surface of tailings ponds during the project life and up to 20 years after project termination. These dust clouds would obscure the mountains surrounding Wah Wah Valley and would reduce the open space effect of the valley floor by limiting visibility from portions of Utah Highway 21. The extent of this impact cannot be determined, but it is anticipated that significant reductions in visibility would occur in localized areas of Wah Wah Valley during the dust storms.

Operation of the alunite mine over the 25-year project life would result in the gradual removal of vegetation and soil on 240 acres. A ridge approximately 1 mile in length would be lowered from 300 to 600 feet along its entire length. A pit with a maximum depth of 450 feet would be created. The mine waste rock pile would gradually grow in size to approximately 175 acres. This waste rock pile would be approximately 1.5 miles in length and 1 mile in width. It would be in the form of a long plateau and would be at approximately the same elevation (7,400 feet) as the top of the mine pit area. Both the alunite mine and the waste rock pile would be at essentially the same elevation as the surrounding topography. They would produce a visible scar in the Wah Wah Mountains near the processing plant and would be visible from Highway 21, approximately 13 miles north at the closest point. The lighter color of the rock material in the mine and on the waste rock pile would contrast sharply with the dark green of the surrounding pinyon-juniper vegetation on the mountain sides and above the mine area. The yellow grasslands of the revegetated area immediately below the proposed mine area would act as a transition zone in reducing the color contrast between the white rock and the green trees. The revegetated area is also visible from Utah Highway 21.

Particulates from the processing plant, fugitive dust from crushing operations, use of unpaved roads and mining operations would reduce visibility in Wah Wah Valley. During relatively stable weather conditions it is probable that the mountains surrounding Wah Wah Valley would be obscured by a light haze that would be caused by the increased particulate levels. However, the potential reduction in visibility is dependent on a number of climatic factors and the extent of this reduction cannot be determined because of a lack of data.

The high level of human activity and noise from plant operations, mining equipment, and blasting would destroy the present tranquility in the southern end of Wah Wah Valley. A small number of hunters, livestock operators, and general recreationists would be affected. Impacts to these users are discussed in the section on Land use.

The visual impacts associated with construction activities and operation of the processing plant and mine would be experienced primarily by the construction workers (maximum of 1,800) during the 42-month construction phase and the 1,000 operations employees during the 25-year life of the project. Travelers on Utah Highway 21 would also be exposed to the visual impacts. The present traffic rate on this highway is light (75 cars per day) and is composed of 80 percent Utah residents, 15 percent heavy trucks, and 5 percent out-of-state residents.

The initial visual impacts from construction operations would be of a relatively temporary nature (42 months). These impacts would occur from disturbances of soil and vegetation followed by erection of structures and buildings. Buildings, stacks at the processing plant, tailings ponds, and the alunite mine and waste rock pile would stand out and overwhelm vegetative and soil disturbances from roads, powerlines, and pipelines. The mine areas and waste rock pile would be a permanent visual impact along with buildings, parking areas, and roads associated with the processing plant.

LAND USE

Each land use category that would be affected by construction and operation of the alunite project is discussed in this section.

Recreation

Fishing. According to a Division of Wildlife Resource survey taken in 1975, approximately one-third of the total population of Utah are fishermen. Assuming this percentage would apply to the projected increase in population from the alunite project, there would be an increase of 1,500 fishermen in Beaver and Iron counties. It is estimated that 80 percent, or 1,200 of these additional fishermen would utilize Minersville Reservoir at least once each year because of the excellent trout fishing in close proximity to Milford, Minersville, and Beaver.

During June (heaviest use period) of 1974, 15,295 people visited the reservoir for recreational purposes. It is anticipated that the greatest increase in fishing pressure would occur during this period. Minersville Reservoir has an average size of 960 acres and a maximum size of 1,130 acres. The additional use pressure could continue further into the season than is traditionally experienced because of the increased number of local fishermen.

The increased use would add to the excessive current demands which normally occur on the 29-unit campground during the peak of the fishing season. Increases in overnight camping would probably be minimal due to the close proximity of Milford, Minersville, Beaver, and Cedar City. There would be added competition for the already limited camping and parking areas on unimproved areas adjacent to the reservoir. Further demands and competition for use of the boat ramp, fish cleaning station, and overflow parking areas would occur particularly during the peak fishing season. The facilities are managed by the Utah Division of Parks and Recreation. Therefore, there may be increased demands on this state agency to provide additional manpower and funds for facility maintenance and cleanup.

Increased visitation at the reservoir, plus competition for available space and facilities would lower the quality of recreational experience for many recreationists. As the fishing season progresses, increased fishing pressure could lower the quality of fishing by depleting the supply of catchable fish. To maintain quality fishing throughout the season would require the Utah Division of Wildlife Resources to make more frequent plantings thereby adding to the cost of their fisheries program.

Hunting. During the 42-month construction phase and the 25-year operating phase, the proposed project would occupy 540 acres, or less than 1 percent of the deer habitat in the area of concern. Removal of this habitat and the disturbance associated with construction and operation of the project would cause deer to leave the area in the immediate vicinity of this project site. These displaced animals would move to adjacent areas in the Wah Wah Mountains. As a direct result of this impact, hunting opportunities in the Wah Wah Mountains would not be significantly reduced, but could be redistributed. According to the State Division of Wildlife Resources (DWR) Harvest Data for 1975, hunter success was lower in the deer herd unit, which includes the project site (10 percent), than for surrounding deer herd units (14 to 25 percent). According to the Utah DWR, approximately 17 percent of the total population of Utah hunted deer in 1975. Assuming this percentage of the projected population increase of 4,500 people would hunt deer, there would be 765 new hunters. This increase represents approximately 0.4 percent of the total number of people who hunted deer in Utah during 1975 and would not produce a significant increase in hunting pressure over the state. A majority of these new hunters probably would go to deer herd units in other parts of the state in pursuit of better hunting. However, the deer in the area of concern would be exposed to an unknown increase in hunting pressure by new residents. During the 1975 season, 493 persons hunted in the herd unit that includes the project site. A relatively small increase in the number of hunters would increase the hunting pressure significantly. Because of the increased human population, the level of poaching would probably increase. The potential increase in both legal hunting and poaching could require additional law enforcement surveillance by the Utah DWR. Additional pressure would also contribute to the several factors influencing the low deer population the state is now experiencing.

Removal of additional deer would eventually affect the quality of the hunting experience as the hunter success ratio declines. Since the area of concern is estimated to provide about 2 percent of the deer hunting in the state, this decrease in the quality of hunting would be a localized impact and would not be significant on a statewide basis.

The opportunity to hunt antelope would be decreased because components of the proposed project would occupy 1,914 acres of antelope habitat. Antelope hunters would be unable to continue hunting on this 1,914 acres. This acreage represents less than 1 percent of the antelope habitat in Wah Wah Valley and the loss of this habitat would have no effect on the quality of antelope hunting since it is believed that displaced antelope would move into other portions of the valley. However, an increase in poaching which could result from population growth in surrounding communities would reduce the number of huntable antelope. Any decrease in the antelope population in Wah Wah Valley would reduce the quality of antelope hunting by making it more difficult to find animals and could also result in the issuance of fewer antelope permits by the DWR.

Skiing. It is expected that some increases in skiing at Mt. Holly and Brian Head ski resorts would occur from the increased population. The amount of this increase has not been determined because of a lack of data. However, the proximity of these ski resorts to the communities of Milford, Minersville, Beaver, and Cedar City would induce a portion of the increased population to participate. These southern Utah ski resorts are not receiving heavy use and would have the capacity to accommodate the additional skiers.

Collecting During the 42-month construction period and the 25-year project life, there would be an increase in rock and mineral collecting by new residents. Collecting demands for smoky quartz and obsidian would increase by an unknown amount. Obsidian is plentiful in the Milford area and this would not have a significant effect on the supply of the mineral. Smoky quartz is a relatively scarce semi-precious gem found in scattered locations of the Mineral Mountains. There is probably an adequate supply of this gem to meet the increased demand without significantly depleting the supply, but increased collecting would make it more difficult for collectors to find smoky quartz. The quality of the rock-hounding experience would gradually decline throughout the 25-year life of the project as the number of easily found specimens of smoky quartz decreased.

An unpredictable increase would occur in the harvesting of woodland products such as Christmas trees, pine nuts, fence posts, and firewood by the increased population. Woodland resources in the region would be more than adequate to meet the increased demands during the 25-year project life.

Sightseeing. Impacts on sightseeing which would result from the proposed project are discussed in the Aesthetics section of this chapter.

Off-road vehicle use. The increased population would result in increased numbers of off-road vehicle users. Impacts from this use are also discussed in the Soils, Vegetation, and Aesthetics sections of this chapter. Based on field observations of BLM personnel in districts adjacent to large population centers, it is anticipated that a majority of the increased ORV use would occur in the vicinity of residential areas. Off-road vehicle activity in desert valleys and mountains within the area of concern would probably be confined to the numerous roads and trails already available. Many of these roads and trails are in poor condition and present an adequate challenge for the ORV user.

The increased use of off-road vehicles adjacent to communities is expected to result in additional hill scarring and disturbance of soil and vegetation. This additional disturbance would occur on unproductive private land which has already received concentrated off-road vehicle use. An increased number of complaints from residents of impacted communities to law enforcement agencies about trespassing and noise would result from this increased ORV use.

Agricultural. The removal of 2,409 acres of vegetation during the 42-month construction period and the 25-year operation phase would result in the eventual loss of 193 Animal Unit Months (AUMs) from six BLM grazing allotments used by five Utah ranchers. Table 3-8 shows the amount of disturbed area and total AUMs that would be lost within each allotment. It also compares lost AUMs against total AUMs licensed within each of the six allotments. With the exception of the 3 percent loss of AUMs in the Willow Creek Allotment, all of the AUMs lost represent 1 percent or less of the total licensed use in the allotment. A loss of 1 percent or less is not considered to be significant since the rancher could make minor adjustments in his operation to maintain current livestock numbers during the life of the project. The loss of 3 percent of the AUMs in the Willow Creek Allotment could result in a reduction in

Table 3-8. Total AUMs in each allotment and AUMs lost from disturbance that would occur during the 25-year project life

Allotment	Total AUMs per allotment	Total disturbed acreage	Total AUMs affected	Affected AUMs as percent of total
Willow Creek[a]	5,317	1,719	156	3%[a]
Bucket Ranch[b]	1,700	473	19	1%
Wah Wah[b]	7,300	47	4	<1%
Antelope Peak	5,432	33	4	<1%
Burn Knoll	920	71	4	<1%
Cook	2,736	66	6	<1%
		2,409	193	

[a] An additional 269 AUMs of federal grazing privileges would be lost in this allotment as a result of the proposed land exchange with the State of Utah.

[b] Used by same ranchers.

livestock numbers. This same rancher would be subject to the loss of an additional 269 AUMs (5 percent) of his federal grazing privileges as a result of the proposed transfer to the state of 5,298 acres of national resource land in the Willow Creek Allotment. The state would transfer control of this land to the applicant who could elect not to allow continuation of grazing. Combining the two figures results in a potential loss of 425 AUMs (8 percent) of the licensed use in the Willow Creek Allotment.

The loss of vegetation as described in the Vegetation section would be a permanent loss of 415 acres (17 AUMs) in the Bucket Ranch Allotment and 158 acres (15 AUMs) in the Willow Creek Allotment. The permanent loss in both the Bucket Ranch Allotment and the Willow Creek Allotment would be less than 1 percent of the total.

Chemical compounds in the tailings ponds as described in Chapter 1 would be hazardous to livestock. These materials could cause death to animals that might drink water from the ponds. The saturated mud created in these tailings ponds could also be a hazard to livestock since animals could bog down in the ponds and die. The number of animals that would be impacted cannot be determined but the loss of only 1 cow (market value of $300 to $500 dollars per head) or several sheep ($50 to $100 dollars per head) would be a significant economic loss to the ranchers. The potential impacts to wildlife from the tailings ponds are discussed in the Wildlife section.

The introduction of a large work force at the project site and the increased populations in nearby communities would increase the potential for livestock disturbance and vandalism to facilities such as fences, gates, corrals, and water developments. Such occurrences would result in increased maintenance costs to the ranchers and would require additional manpower and expenditure by the ranchers for livestock handling. The increased population would likely increase the rate of rustling over present levels. The extent of this increase would be difficult to determine because of lack of information about present rustling and the inability of ranchers to determine whether livestock have been lost by natural means or have been rustled. Any increase in expenditure by ranchers for maintenance and additional grazing use supervision would be a significant economic impact.

Increased traffic of up to 750 vehicles per day on the unfenced 10-mile paved access highway during the 42-month construction phase and 25-year operation life of the proposed development would create the potential for loss of livestock from traffic accidents. The estimated average of 2.5 unit trains per day that would use the unfenced railroad spur could also cause loss of livestock. The number of animals that would be killed in accidents on the highway and railroad cannot be accurately determined but the loss of only 1 cow or several sheep would be a significant economic loss to the rancher.

Transportation. Combining present traffic rates (75 cars per day) with projected industrial and commuting labor force traffic rates (up to 750 cars per day) would result in the use of Highway 21 by 825 vehicles per day during the operational phase of the project. The traffic rate would be less than this estimated rate during the first 18 months of the construction period and would probably exceed the estimated rate during the last 24 months of the construction period.

Maintenance of Highway 21 is the responsibility of the Utah Department of Transportation. The transport of heavy processing equipment from Milford to the project site should not result in substantial damage to the surface of the highway since the weight of all vehicles would be within the capacity of overload permits. The increased traffic rate during the 42-month construction period and the 25-year operational life of the project would result in accelerated deterioration of the highway surface and increased maintenance costs. The Utah Department of Transportation estimates that with the existing traffic rate, the pavement on U-21 should last about 2 years before failure. However, based on the projected traffic rates during the construction period, it is estimated that the present pavement would only last for a few months. The Department of Transportation estimates that the highway surface could be rehabilitated by putting a 4-inch overlay of bituminous material over the existing pavement before plant construction begins. This new surface would last at least 10 years at the increased traffic rates and would cost approximately $900,000.

Motorists on the access highway from U-21 to the plant site would be subject to injury, death, and property damage as a result of accidents with range livestock. The accident rate cannot be predicted because of a lack of data. However, according to projections made by the Utah Department of Transportation, a greater number of accidents can be expected on U-21 because of the increased traffic volume, but no increase in hazard (accident rate) would occur.

Urban/residential land use. The amount of land that would be required for the establishment of new residential dwellings for the increased population is estimated by computer modeling to be about 300 acres. This figure assumes that 85 percent of the increased population would live in Milford and Minersville. There is more than enough nonagricultural land within the city limits and adjacent to Milford to accommodate the projected expansion (see Socioeconomic section). Adequate nonagricultural land suitable for residential development is also available in other communities that would be impacted. However, if Beaver County fails to implement ordinances necessary to control growth of residential areas in unincorporated portions of the county, then agricultural cropland could be utilized for residential housing, particularly in the southern Milford area. Assuming that all the residential expansion occurred on agricultural cropland then 300 acres would be taken out of production. This acreage represents less than 1 percent of the cropland in Beaver County. Assuming annual production of 4 tons per acre of alfalfa hay at $60 per ton there would be an annual loss of $72,000 in gross agricultural income to Beaver County.

Mineral development. The proposed alunite project would prevent the development of at least two mining claims located by other individuals on the project site. The validity and potential value of these claims have not been established. One of these claims would be covered by material from the waste dump; the other claim is located in the southeast portion of the processing plant complex and would be included in the proposed land exchange. If the claim in the processing plant complex is found to be valid, the land exchange cannot be consummated without adjustments in the proposed project. Unresolved issues between mining claimants and the applicant may have to be resolved in court if mining claims are found to be valid.

SOCIOECONOMIC CONDITIONS

Population

Projected trends. About 4,500 new persons would be expected at the full operating level of the alunite project. This includes the operating and maintenance work force (basic employees), their families, new employment stimulated by the project (nonbasic employees), and their families. It is expected that between 80 and 90 percent of the new population would live in Beaver County, and the remaining 10 to 20 percent in Cedar City. Those choosing to live in Beaver County rather than Iron County would be looking for a community close to the project site; thus Milford is expected to receive about 95 percent of the new population in Beaver County. Minersville is expected to receive about 5 percent of the Beaver County impact. Beaver and the remainder of Beaver County would receive 1 percent or less.

Figure 3-1 shows population projections with and without the alunite project. These projections were prepared by the State Planning Coordinator's Office, Division of Technical Services, using the Utah Process Land Use and Tax Base (UPLAND) Model. Table 3-9 shows the UPLAND projections by Census County Divisions (CCDs), which are the smallest breakdown available. Approximately 3,512 new persons would be expected in the Milford-Minersville area at peak construction, and 4,027 at the full operating level. It is not known how many persons would live in Milford and how many would live in Minersville, since Milford and Minersville are in the same CCD. However, because of the greater advantages associated with living in Milford (e.g., more goods and services, more available housing, etc.), 90 to 95 percent of the population projected for the Milford-Minersville CCD is expected to live in Milford.

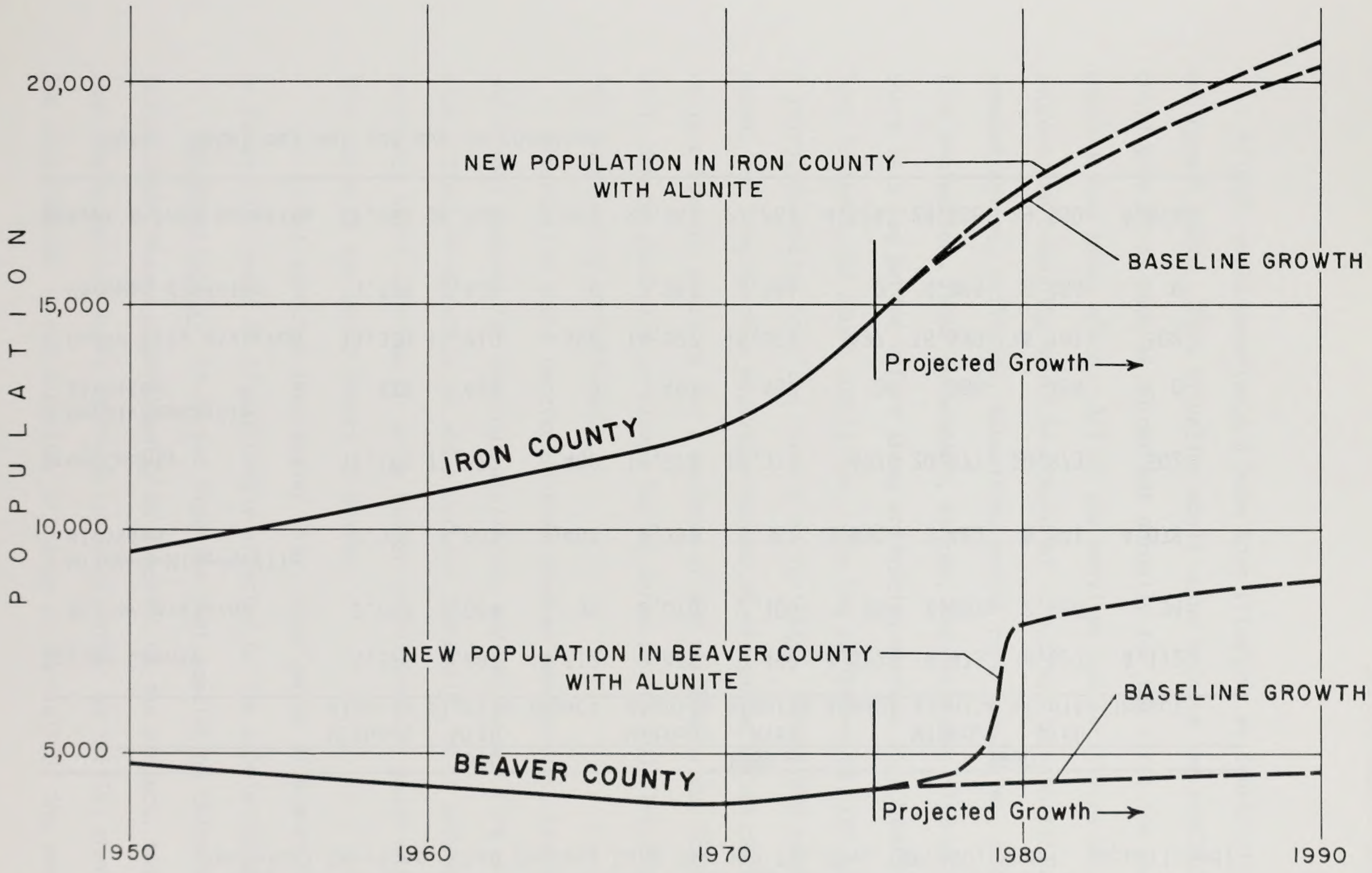


Figure 3-1

POPULATION GROWTH
BEAVER AND IRON COUNTIES
WITH ALUNITE

Source: Office of the State Planning Coordinator, Division of Technical Services, unpublished data (UPED & UPLAND models)

Table 3-9. Population projections with and without proposed alunite project by Census County Divisions (Office of the State Planning Coordinator, Division of Technical Services, Utah Process Land Use and Tax Base (UPLAND) Model, unpublished)

	1980			1985			1990		
	Without alunite	With alunite	Impact	Without alunite	With alunite	impact	Without alunite	With alunite	impact
Beaver County	4,375	7,887	3,512	4,465	8,492	4,027	5,515	8,627	4,112
Beaver division	2,054	2,084	30	2,070	2,105	35	2,052	2,086	34
Milford-Minersville division	2,321	5,803	3,482	2,395	6,387	3,992	2,463	6,541	4,078
Iron County	17,191	17,672	482	18,878	19,375	497	20,371	20,873	502
Beryl-Newcastle division	428	428	0	407	407	0	388	388	0
Cedar City division	13,328	13,810	482	14,527	15,024	497	15,599	16,101	502
Parowan division	3,434	3,434	0	3,944	3,944	0	4,384	4,384	0
Beaver & Iron counties	21,566	25,559	3,993	23,343	27,867	4,524	24,886	29,500	4,614

Note: Total may not add due to rounding.

Milford would experience a boom town situation as construction employment peaks. This situation would occur because the population could grow by as much as 30 percent annually for the first few years as construction takes place. All of the services and facilities which support the community would be pressured - housing, transportation, communications, utilities, education, health care facilities, police and fire protection, local government, stores, and services. Typically, there is a lag period before these activities operate at a level sufficient to serve the added population. The lag period would last from 2 to 4 years, depending upon the service or facility. During the construction phase, the singles-only housing proposed at the project site could relieve housing pressure for a maximum of 900 employees, but they would still demand goods and services, health care, police and fire protection from surrounding communities.

Minersville could receive several hundred new persons, causing additional demands for housing, utilities, and police and fire protection. Since Minersville is not a service community, it is assumed that residents would continue to go to Beaver or Milford for goods and services. This could be the major impact to Beaver.

It is not expected that Beaver City, other parts of Beaver County, or Cedar City would be significantly affected by the population growth.

Characteristics. It is not expected that population characteristics would change significantly as a result of the project, but trends that are occurring would continue to occur, after an initial change. Sex distribution is not expected to change as a result of the proposed project. Household size would be slightly larger, but continuing a downward trend. Age distribution would also continue the pattern of fewer under 18 and more over 65, but fewer persons over 65 would be expected with the project. Table 3-10 shows these expected changes with and without the project.

Migration. The trend of outmigration would reverse itself, since new people would be moving into the area to fill the jobs. There are presently not enough people in the area with sufficient skills to fill all the jobs. The UPED and UPLAND Model projections reflect the existing labor market in the area and represent the number of new persons expected as a result of the alunite proposal. It is not known how many jobs would be filled by existing residents, but it is possible that as many as 20 to 50 percent of all new jobs (those at the project site and those new nonbasic jobs resulting from it) would be filled by existing residents, and the remainder would be filled by inmigration to the area.

Employment and economic base

Employment and trends. Project employment would require labor from three broad industrial sectors - construction, mining, and manufacturing. Construction employment would continue for 42 months, peaking about 2 years after startup. Operating employment (mining and manufacturing) would begin after 1 year of construction and reach full operating level when construction was completed. Construction and operating employment numbers are shown in Chapter 1.

Table 3-10. Population characteristics projected with and without alunite, southwestern Utah, Arizona Strip and Page, Arizona. (Office of the State Planning Coordinator, Division of Technical Services, UPED Model Alternative Futures)[a]

	Percent male/ percent female	Persons per household	Percent under 18 years	Percent under 65 years
1975	49.9/50.1	3.41	35.5	10.0
1980 Baseline	49.7/50.3	3.25	34.0	10.6
1980 Alunite	49.7/50.3	3.26	33.8	10.2
1985 Baseline	49.5/50.5	3.14	33.3	11.1
1985 Alunite	49.6/50.4	3.15	33.4	10.6
1990 Baseline	49.5/50.5	3.06	32.2	11.1
1990 Alunite	49.5/50.5	3.07	32.3	10.6

[a] Although the information is available for a much larger area of concern, the only difference between the baseline and the alunite projections is the addition of alunite, thus the impacts are the direct result of alunite, and would occur primarily in Beaver County.

All of the employment at the project site would be basic employment, i.e., that which produces goods and services for export. This includes employment directly related to export (operating employment) or indirectly related (construction employment). Basic employment stimulates the growth of nonbasic industries such as trade, finance, health care, construction of homes for new population, etc. New nonbasic employment is projected to expand at a slower rate than basic employment and finally stabilize about 5 years after the project begins. Expected effects on regional employment were obtained from the Utah State Planning Coordinator's Office, Division of Technical Services, using the UPED Model Alternative Futures. Table 3-11 shows these projected employment

Table 3-11. Projected employment with and without proposed alunite project, southwestern Utah and Page, Arizona (Source: State Planning Coordinator's Office, Utah Process Economic and Demographic Projections, unpublished data, 1976)

	1975 Estimates	1980 Projection without alunite	Average annual growth 1975-80	1980 Projection with alunite	Average annual growth 1975-80	1985 Projection without alunite	Average annual growth 1980-85	1985 Projection with alunite	Average annual growth 1980-85	1990 projection without alunite	Average annual growth 1985-90	1990 Projection with alunite	Average annual growth 1985-90
Agriculture	1,316	1,257	-0.9	1,270	-0.7	1,181	-1.2	1,196	-1.2	1,123	-1.0	1,136	-1.0
Mining	432	453	+0.1	503	+3.1	474	-0.9	574	+2.7	494	+0.8	594	+0.7
Contract construction	1,386	1,491	+1.5	3,334	+19.2	1,583	+1.2	1,637	+0.4	1,613	-13.3	1,668	+0.4
Manufacturing	1,218	1,610	+5.7	1,650	+6.3	1,694	+1.0	2,606	+9.6	1,796	+1.2	2,708	+0.8
Transportation, Communications, and public utilities	1,138	1,374	+3.8	1,401	+4.2	1,408	+0.5	1,442	+0.6	1,449	+0.6	1,483	+0.6
Wholesale and retail trade	4,865	6,027	+4.4	6,286	+5.3	6,843	+2.6	7,166	+2.7	7,659	+2.3	7,989	+2.2
Finance insurance and real estate	622	666	+1.4	702	+2.4	730	+1.9	788	+2.1	843	+2.9	896	+2.9
Services	2,944	3,739	+4.9	3,894	+5.8	4,451	+3.5	4,660	+3.7	5,140	+2.9	5,370	+2.9
Government	3,977	4,399	+2.0	4,624	+3.1	4,803	+1.8	5,034	+1.7	5,373	+2.3	5,625	+2.2
Federal military	17	20	-13.3	20	+3.3	24	+3.7	24	+3.7	29	+2.9	29	+2.9
Federal civilian	731	798	+1.8	798	+1.8	838	+1.0	838	+1.0	903	+1.5	903	+1.5
State nonschool	400	507	+4.9	532	+5.9	597	+3.3	629	+3.4	688	+2.9	723	+2.8
State school	642	693	+1.5	726	+2.5	759	+1.8	755	+1.3	876	+2.9	890	+2.8
Local nonschool	1,057	1,232	+3.1	1,312	+4.4	1,311	+1.3	1,407	+1.4	1,477	+2.4	1,581	+2.4
Local school	1,130	1,150	+0.4	1,236	+1.8	1,275	+2.1	1,360	+1.9	1,400	+1.9	1,499	+2.0
Total	17,898	21,016	+3.3	23,664	+5.7	23,167	+2.0	25,103	+1.2	25,490	+1.9	27,469	+1.8

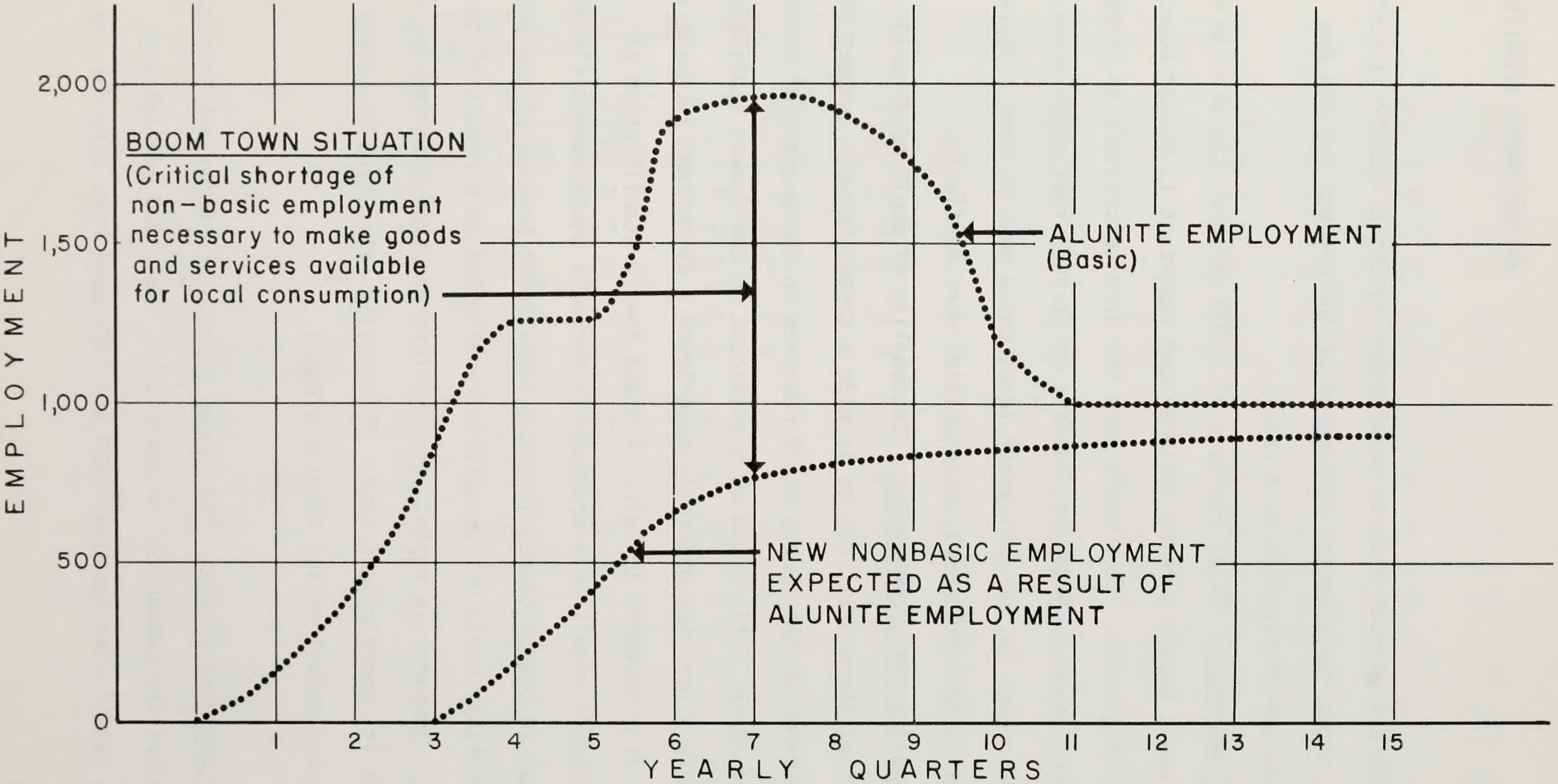
figures with and without alunite development by broad industrial sector. Figure 3-2 shows the expected employment at the project and the new nonbasic employment expected as a result.

Major employers. As an employer of 1,000 persons, the alunite mine and plant would become a major employer and important to Beaver County and surrounding areas. This would make the area susceptible to change in employment levels, shutdowns, layoffs or strikes that might occur. Any such decreases in the employment level could make Milford a depressed area, unless other employment opportunities were available.

Seasonality and unemployment. Seasonality of employment could change in that there would not be as wide a spread between numbers of employed persons in the lowest month compared to those employed during the highest month. This could be significant to employment stability in Beaver County since they presently experience a 20-percent increase in employment from November to July. A trend toward stabilization of employment would result in a decrease in periodic unemployment claims. Unemployment in Beaver County is not a significant problem at the present time and probably would not be materially affected as a result of new population. However, in recent years Milford has been experiencing an increase in its unemployment rate. This rising rate could be slowed or decreased as a result of the alunite project.

Income

Total personal income. The income impacts of employment proposed at the project are summarized in table 3-12. Weighted average wage rates were established based on 1973 and 1974 wage rate data for the



SOURCES: Lewis and Associates, Alunite: A Socio-Eeonomic Study, Logan, Utah, 1974.
Office of the State Planning Coordinator, Division of Technical Services.
Utah Process Economic and Demographic (UPED) Model, unpublished data.

FIGURE 3-2
EMPLOYMENT IMPACTS-ALUNITE

Table 3-12. Quarterly income impacts expected from alunite - construction and operating employees, 1977 to 1980

		Construction			Operation		
Year	Quarter	Annual wage rate	Employment	Total wages (000's of $)	Annual wage rate	Employment	Total wages (000's of $)
1977	IV	$23,800	150	$ 893			
1978	I	25,300	450	2,846			
	II	25,300	900	5,693			
	III	25,300	1,250	7,906			
	IV	25,300	1,250	7,906			
1979	I	26,700	1,800	12,015	$14,300	80	$ 286
	II	26,700	1,800	12,015	14,300	150	536
	III	26,700	1,700	11,348	14,300	230	822
	IV	26,700	1,200	8,010	14,300	560	2,002
1980	I	28,300	400	2,830	15,200	800	3,040
	II				15,200	1,000	3,040
	III				15,200	1,000	3,040
	IV				15,200	1,000	3,040

construction and operating phases of the plant (Lewis and Associates, 1974). These data were adjusted for expected inflation factors (totaling 6 to 7 percent annually) to estimate the weighted average wage rates for the 1977 to 1980 period. At full initial operating capacity in 1980, about $15 million in wages would be paid annually at the project. As this money is spent and becomes income to others, it would generate approximately $25 million more in indirect effects. This would be almost a 40-percent increase in personal income for Beaver and Iron counties combined. The increased income could substantially increase the standard of living.

Income distribution. Project wages are expected to be substantially higher than the average wages paid in the area. In 1975, the average wage paid in Beaver County was approximately $7,000 and in Iron County about $6,900. These wages are only about one-half as much as project workers could make. Wages in other sectors would probably have to increase to compete with project wages. Median family income for both counties could increase substantially, but an exact determination cannot be made.

Spending patterns could change as a result of the project. As a person's income increases, more money is often spent for luxury items and recreation which, in turn, would tend to expand employment. The effects of this new spendable income would be felt in all communities, particularly in the larger nearby towns where goods and services would be available. Cedar City, as a regional service center, has the best shopping facilities and services available, so for many larger items or for a greater choice of goods, many people would probably shop there.

Infrastructures

Transportation

Airports, air service. Airline traffic to Cedar City and Milford could increase by as much as 20 percent and make the present operations more economically viable. It is not expected that this increased volume would create any problems.

Rail service. Nearly 2.5 unit trains (70 to 100 cars each) would arrive and leave the plant site daily. Union Pacific Railroad is capable of handling this additional volume.

Major highways. Project workers would have to travel west on Utah Highway 21 through Milford to get to work. Once outside Milford, the traffic would have no problems. Additional traffic through Milford would worsen the existing traffic congestion problem, although the amount of traffic would probably just reach the streets' carrying capacities. As Milford's population increases, traffic in downtown Milford could triple. Project workers living in other communities would also have to travel on Highway 21 through Milford to work. Increased congestion would slow through-traffic and create safety problems. This increased traffic would significantly increase the noise level for residents of Milford and would increase the level of pollutants from vehicular sources. However, the increased pollution level is expected to be insignificant in comparison with major population centers. Traffic would also increase on Interstate 15 and Utah Highway 130. According to the Utah Department of Transportation, these highways are capable of handling the increased traffic.

Communications. The existing office and telephone equipment in Milford would not be adequate to accommodate rapid growth. As the need develops, Mountain Bell Telephone Company would be required to reinforce existing facilities. It is not anticipated that other communities would need reinforcements other than new telephone connections.

Public utilities

Water. Water storage in Milford would be inadequate to meet the needs of the new population, since the system is too small for the present population and requires an additional 60,000 gallons of capacity.

New water storage facilities with a capacity of about 1.5 million gallons would be necessary to serve the expected new population in Milford. Demands for water in Minersville would increase substantially with the expected new population. Recently completed work on a new well has increased water sources, but improvements to storage facilities would be needed. Beaver has sufficient water sources to meet expected growth, but storage facilities lack 308,000 gallons of capacity. The impact to water storage facilities would serve to make the present situation slightly worse, but additional facilities are needed regardless of the alunite development. Cedar City's water system would be adequate to handle the expected growth.

Sewage systems. Although Milford has a new sewage system capable of serving 600 to 700 new persons, this would be inadequate for the expected new population, and additional land on which to expand the lagoon would be necessary. Since Minersville's present use of individual septic tanks is already a problem, any further growth would serve to make the problem worse. Sewer systems in Beaver and Cedar City would be capable of accommodating the expected growth.

Other utilities. There would be a significant impact upon the supply of electricity to Milford. Since the existing 46 kV power line is delivering electricity at or near capacity, any new users could only be served marginally. Utah Power and Light Company indicates that a 138 kV line from Beaver would be necessary to serve Milford if the project is implemented. No major problems are anticipated in upgrading the existing line from 46 kV to 138 kV.

Education. It is expected that the number of school age children in Beaver and Iron counties would increase by about 25 percent (1,100 more students) as a result of the project. Since 80 to 90 percent of these children would be expected to reside in Beaver County, the existing enrollments would almost double. Milford Elementary School and Milford High School would receive the greatest enrollment, with the two schools sharing an estimated 700 to 900 new students. Milford Elementary School would need building enlargements to double existing capacity or construction of a new school elsewhere in the town. An additional eight to ten new teachers would be required, plus various support personnel. Milford High School would need to separate junior and senior high school activities to make more time available to use the school. The old gym could be remodeled to provide additional classroom space. Five to ten new teachers would be needed, as well as a full-time counselor and other support personnel. Minersville Elementary School would have to accommodate from 35 to 90 more students. This would require up to three new teachers and several more classrooms. Beaver High School and Belknap Elementary School in Beaver could receive up to 20 new students, but the schools would be able to absorb the increases.

The 10 to 20 percent of the new school age children expected to live in Iron County would be able to enter existing schools without pressuring facilities. To meet the current student-teacher ratio (23.6), between five and ten new teachers would be required.

Public safety. If Beaver County is to maintain its present level of law enforcement (3.1 law enforcement personnel per 1,000 population), an additional 10 to 15 law enforcement personnel would be required. Most of these people would be needed in the Milford-Minersville area, with the remainder in Beaver. It is not anticipated that Cedar City would need any additional police protection as a result of expected new population. As a result of the project, there would be a greater need for fire protection. The 15 to 20-man volunteer fire fighting force in Milford would need additional volunteers and several new trucks. Minersville would need at least one new truck to serve a larger population. An increase in taxes could be necessary to provide funding for these equipment needs. Beaver and Cedar City should not require additional equipment or personnel.

Primary medical care. New population in Milford would increase demands for health care. Two or three new doctors would be needed. The existing hospital in Milford could expand patient facilities, but this would require a new facility to care for long-term patients who are currently cared for in the Milford Valley Memorial Hospital. Staffing an expanded facility could be a problem since finding qualified help has been a problem in the past. Minersville residents would have to continue to go to Beaver or Milford for health care. If Minersville was to grow at a faster rate, it would create a need for a physician. It is not expected that Cedar City or Beaver would have any problems providing health care. The number of dentists in Milford and Beaver would be sufficient for the new population.

Housing. Demand for housing would increase greatly as the construction employment peaks. When discussing the impacts to housing, it is assumed that a maximum of 900 construction workers would be housed in the singles-only facilities at the project site. The remaining construction employees would then be in search of housing. At peak construction, about 900 construction employees, 100 operating employees, their families, and all the new nonbasic employees and their families, a total of about 4,000 persons, would be in search of housing. This translates into the following approximate demand for new dwelling units by community:

Milford	600 to 700
Minersville	40 to 80
Beaver	5 to 10
Other parts of Beaver County	30 to 70
Cedar City	60 to 120

This demand does not consider the existing housing that would be available at the time. It is expected that initially a larger proportion of new population would look for housing in Cedar City, since more housing is available there than anywhere else in the area. This would mean there could be less housing available to meet the demands of natural growth in Cedar City, but it would not have a significant adverse impact on housing in Cedar City. Beaver would not experience any significant problems in absorbing the expected housing demand. Milford and Minersville would both be hard-pressed to meet the housing demand, since neither community has an adequate supply of available housing. It is not expected that new housing construction could keep pace with demand. Construction workers would tend to demand mobile homes and multi-family units; the permanent work force would probably prefer single-family homes, although those looking for homes to buy may have to occupy temporary housing in the interim.

It should be noted that some of the construction employees could live in nonpermanent housing, such as hotels and motels and some may choose to camp out. Increased hotel and motel utilization should not create any problems, but a lack of specified camping areas, plus waste and litter disposal facilities, could create problems if substantial numbers of workers decided to camp out.

At the full operation level, construction employment would be completed and all of the new population (basic and nonbasic) would be looking for permanent housing. It is expected that about one-third of the housing demand would be for mobile homes, one-half would be for single family units, and the remainder for multi-family units. It is expected that the following number of dwelling units would be demanded at full operating level. (These figures include the demand at peak construction shown on the previous page, and are not in addition to the construction requirements.)

Milford	1,000 to 1,200
Minersville	80 to 140
Beaver	10 to 20
Other parts of Beaver County	60 to 100
Cedar City	120 to 180

Again, Cedar City and Beaver would undergo the least pressure in absorbing the expected new housing demands. Milford and Minersville would be expected to supply housing requirements at a much slower rate since most of the housing demands would have to be met through new construction. As a result some families could be forced to live in substandard housing before new housing would be available. The end result would be increased value of housing, both total and per unit. In addition, the quality of housing would improve.

Government and taxation

Organization of different levels of government. It is not expected that the structure of local government in Beaver or Iron counties would change as a result of the alunite development. In Beaver County, the number of city and county employees could double as a result of the new population.

Taxation and revenue. The assessed valuation of all property in Beaver County would increase by more than 500 percent at the full operating level of the plant. Assessed valuation could increase to $80 million, compared to present valuations of less than $13 million. Beaver County revenues would increase by more than 500 percent over the 1975 level of $136,000. Milford's 1975 revenues were $40,406, and these could increase by more than 400 percent at the full operating level. Minersville revenues would be expected to increase by more than 250 percent over the 1975 level of $9,281. Beaver revenues could double from the 1975 level of $26,436. It is not known how much the tax base of Iron County would increase, but it is not expected to increase significantly compared to the present level.

Bonding. The impacts that would occur to bonded indebtedness are not known. The amount of bonding necessary to support a locale depends upon availability of other sources of funds for community development, and these are unknown at this time. It is expected that the amount of bonded indebtedness would increase somewhat as a result of alunite development.

Quality of life. Similar impacts to quality of life have been noted in several western towns experiencing boom growth (Logan, et al., 1976). Often it is impossible for housing, health care, education, recreation, and cultural opportunities to expand fast enough to meet increased demand. This results in a generally degraded quality of life. It is not known if impacts to quality of life would occur as a result of the proposed project, so this section will consist of a discussion of the experiences of other towns experiencing boom growth. However, whether or not these same experiences would occur or to what extent they would occur is not known. It should be noted that while a degraded quality of life could result for some, others would experience an improved quality of life, due to new jobs and increased income.

Community homogeneity. The degree of community homogeneity in the Milford-Minersville area could change as a result of the proposed project. The high degree of cultural and racial homogeneity of the population could be affected by inmigration of new population. The new population could tend to be more culturally and racially heterogeneous, thus the degree of cultural and racial homogeneity would be lowered. A greater heterogeneity of traditions, attitudes, and behavior patterns would raise the possibility of value conflicts. The degree to which value conflicts could occur and the possibility of their occurrence is not known, but should they occur, the existing population would experience a degraded quality of life. Since Beaver and Cedar City are not expected to receive a significant amount of new population, and since Cedar City has a more diverse population, the degree of community homogeneity is not expected to change in these areas.

Public attitudes. The attitudes of Milford area residents toward their environment could change as a result of the proposed project (see tables 2-33 and 2-34). Whereas residents are currently satisfied with their community, feel the advantages associated with living there outweigh the disadvantages, and are willing to pay higher taxes for increased services, the opposite could be the case after the influx of new population. After experiencing rapid growth, residents may not feel satisfied with their community, feel that disadvantages outweigh advantages, and would be unwilling to pay increased taxes for services. It is not known whether or not these attitude changes would occur, and if so, to what extent attitudes would change.

Availability of goods and services. Goods and services would be affected since there would be a lag of several years in the availability of additional goods and services to meet the demand of the new population. New housing construction will be discussed separately from other goods and services since the impacts associated with it would be substantially different. Demands for all goods and services would occur primarily in Milford, but Beaver would realize an increased demand for goods and services as part of an overflow from Milford. Cedar City would also be expected to have an increased demand for goods and services, but impacts should be minimal.

Lags in availability of goods and services are expected to occur as demand grows faster than supply. These lags could be expected to continue for several years after the project reached its full operating capacity, but with a narrowing gap as availability reaches a new equilibrium level. Two effects could occur as a result of these lags: increased prices for existing goods and services, and a strain on the communities as they try to accommodate the new level of demand. Increased prices would affect long-time residents of the area, if their incomes remained about the same, by making them less able to afford the new higher prices. Strains on the communities as they try to accommodate the higher level of demand could translate into community and personnel disorganization. Signs of this include precipitous increases in rates of divorce, family instability, alcoholism, crime, mental illness, suicide, and attempted suicide. It is not known if these problems would actually occur, but they have been noted in other western communities experiencing such rapid growth (Logan, et al., 1976).

There would be longrun beneficial impacts to the availability of goods and services in Milford. Since Milford currently has relatively few stores and services, any growth in these sectors would benefit both new and long-term residents of the area. A greater diversity of goods and services available in Milford would encourage residents to shop there rather than driving to other communities to make purchases. This would improve the overall quality of life in the Milford area.

The lag in new housing construction could have two effects on the Milford area: an increase in temporary housing and the development of fringe settlements outside existing communities. In situations of housing shortages, temporary housing can be used permanently. Problems with this are that temporary housing is normally substandard and people living in them are unable to enjoy a standard of living equal to their income. A degraded quality of life can occur for residents of fringe settlements outside existing communities. It has been noted in other instances that people who live in fringe settlements tend to participate less in community activities and become less a part of the community.

LAND USE PLANS AND CONTROLS

Land use plans and controls implemented by federal, state, and local governments in Beaver and Iron counties would be affected by the increased growth that would result from the alunite project. Existing community services planning and provisions for enforcing ordinances by local governments would be inadequate. Resource management plans of federal and state agencies would also have to be revised to accommodate the demands for increased use of public lands that would result from the additional population in the region.

Local land use plans and controls. The master plan, zoning, and subdivision ordinances for the communities of Beaver and Minersville were developed prior to knowledge of the proposed alunite development. However, Milford and Beaver County recently adopted amended zoning, mobile home subdivision, and street ordinances designed to facilitate rapid growth from the alunite project. If the ordinances for Minersville and Beaver are not brought up to the same level as those enacted for Milford, it is likely that considerable unregulated growth could occur. This would occur because a lack of restrictions and/or requirements for water, sewer, and street improvements would result in lower building costs. However, even with the revised ordinances, the existing county organization for enforcing ordinances and providing additional community services would not be adequate to handle the increased workload.

The existing land use plans and the organization for enforcement of ordinances in Iron County and Cedar City would probably be adequate to handle the portion of the population increase that would occur in Iron County. However, if Beaver County were to enforce county-wide ordinances for the regulation of growth, it is possible that significant growth could occur in unincorporated portions of Iron County just south of the Beaver County line. The existing subdivision ordinances in Iron County are adequate to deal with the situation. The master plan for Cedar City is outdated because of unplanned growth in recent years, but Cedar City officials are in the process of making necessary revisions to the master plan to provide for growth that could result from the alunite project.

State land use plans and controls. Impacts on state controls for the use of water resources are discussed in the Hydrology section of this chapter, and state recreation development of Minersville Reservoir is discussed in the Land use section.

Federal land use plans and controls. The BLM considered the proposed alunite project in developing the Unit Resource Analysis and Management Framework Plan for the national resource lands that would be affected by the project components and the increased population.

CHAPTER 4

MITIGATING MEASURES NOT INCLUDED IN THE PROPOSED ACTION

CHAPTER 4

MITIGATING MEASURES NOT INCLUDED IN THE PROPOSED ACTION

INTRODUCTION

As outlined in Chapter 1, federal, state, and local government agencies would be required to issue rights-of-way and other grants or permits necessary to allow implementation of those portions of the proposed project on lands under their respective administration. Mitigating measures to protect or enhance the environment in regard to design, construction, operation, and maintenance of the project are identified, discussed, and evaluated in this section.

The analysis of environmental impacts in Chapter 3 was conducted on the assumption that all design mitigating features incorporated into the proposed project as described in Chapter 1 would be operational. This chapter contains an evaluation of mitigating measures not included in the proposed action. These include measures that would be required by each level of government and those to which the applicant has firmly committed himself.

Following are the specific mitigating measures not included in the proposed action that would be required by each level of government and those committed by the applicant. Mitigating measures proposed by governmental agencies are limited to those considered to be feasible, committed, and enforceable.

MITIGATION

MEASURES COMMITTED BY FEDERAL AGENCIES

1. Water sprinkling of unpaved roads would be required during all dry periods to control dust from vehicular traffic. Frequency of sprinkling would be determined by the BLM Cedar City District Manager and U.S. Geological Survey Area Mining Supervisor.
2. Scalping of topsoil would not be allowed outside BLM rights-of-way and construction sites.
3. When present, top soil would be stockpiled at BLM gravel and basalt material sale sites so that it would not be mixed with subsoils and could be spread and used for reclamation of the sites.
4. Brush blades would be used instead of dirt blades in clearing operations on BLM rights-of-way, the lease area, and material sites where such use would preserve the natural grass and low brush cover.
5. Immediately following construction activities, temporary areas and temporary access roads to offsite facilities such as water wells, material sites, and construction sites would be graded to a form compatible with the surrounding topography. Where soil and precipitation conditions are favorable, these areas would be reseeded as specified by the BLM Cedar City District Manager.
6. To eliminate the possibility of raptor electrocution, power transmission structures would be designed with wire spacing and grounding systems that conform to guidelines for rural electric associations.
7. To protect and preserve cultural values, the following measures would be required:

a. As recommended by BYU, the applicant would provide for at least partial excavation of the rock house and dugout located in Blawn Wash. Additionally, the charcoal kilns would be located, extensively photographed, and an evaluation of the structural condition would be completed to determine whether stabilization is necessary for public safety, recreation use, and historical values.

b. The small cabin to be covered by spoil would be extensively photographed, described as to architectural detail and researched as to dates and nature of use.

c. The applicant would provide for salvage of the 27 sites located along the ore conveyor and road from the mine to the plant, and the mine water system. These include 42Be 141, 142, 155, 156, 158, 159, 160, 161, 162, 163, 164, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 180, 181, 182, 183, and 184. If sites have no appreciable depth, they would be totally surface collected, to include scraping and screening of topsoil, using some sort of grid system. If depth of deposit is found, sites would be totally excavated using appropriate horizontal and vertical controls.

d. Since the project is located in such a high density archaeological area, the applicant would provide for test excavations to be conducted at nine of the 50 sites presently known in the Blawn Wash area. Tests would be significantly extensive to determine presence or absence of depth and/or horizontal stratification. Sites to be tested are 42Be129, 133, 134, 141, 149, 166, 186, 189, 194.

e. During actual dirt moving construction operations (excluding mine operation), the applicant would provide for a professional archaeologist onsite to watch for buried sites and halt operations until adequate mitigating measures are implemented.

f. Areas to be disturbed by construction, to include support and auxiliary facilities, and not covered by the BYU survey, would be subjected to an intensive archaeological and historical survey. Sites would be evaluated for National Register potential, avoided if possible, or salvaged if necessary.

8. At the completion of alunite mining operations, all structures, equipment, and refuse would be removed from the mining area. Where appropriate, disturbed areas would be graded as specified by the BLM Cedar City District Manager and U.S. Geological Survey Area Mining Supervisor.

9. Upon abandonment of the processing plant complex all structures, equipment, and facilities no longer in use would be removed from national resource lands. Where appropriate, disturbed areas would be graded as specified by the BLM Cedar City District Manager.

10. The applicant would fence the tailings ponds with a 4-foot net wire base and three strands of barbed wire to a height of at least 6 feet to keep wildlife, wild horses, and livestock from contact with toxic chemicals or entrapment in the tailings mud. The applicant would be responsible for the maintenance of this fence.

11. The applicant would be required to install cattleguards on roads and rights-of-way, where, in the opinion of the BLM District Manager, the traffic justifies such installation.

MEASURES COMMITTED BY STATE AND LOCAL AGENCIES

On March 24, 1976, the Cedar City BLM Environmental Project Office sent a letter (see appendix D) to the Beaver County Planning and Development Council requesting their help in coordinating state and local mitigating measures for socioeconomic conditions. Since BLM has limited authority to enforce socioeconomic mitigating measures, the mitigation that would occur would be the result of state and local government action. The following is a list of the mitigating measures planned or undertaken by state and local governments.

General mitigation. The Beaver County Planning and Development Council is a mitigating measure in itself because it is a tool that can assist in advance planning which leads to effective mitigation.

Milford City ordinances are presently being revised. Minersville is planning to adopt a set of ordinances and codes. Existing county ordinances have been assessed and recommendations prepared in relation to (1) voids and problems in existing ordinances, (2) alternatives to correct voids and problems, and (3) a process to update and adopt a revised ordinance and codes program.

Highway. Advance planning will be carried out, along with early zoning and rights-of-way purchases. The Utah Department of Transportation will cooperate in the development of traffic management plans.

Water supply. Milford voters have approved a $340,000 bond issue to improve water storage and distribution and the city intends to plan and develop a storage improvement program. Minersville has developed a plan to determine expansion necessary for different growth levels to be met as the town grows. Beaver City has initiated a program to use funds from the sale of water to expand the water system.

Sewage systems. Milford has purchased property to expand the sewage lagoon, and has applied for a $20,000 federal grant to plan for improvements. Minersville will build a lagoon system if funding becomes available in which case system enlargements would be the only requirement to handle the new population. Beaver City is willing to increase the pumping capacity of their system if it becomes necessary.

Education. The Beaver County School District has undertaken preliminary planning and is prepared to accomplish additional advanced planning and development. In 1976, the Utah State Legislature provided two mechanisms to aid schools in growth areas: prepayment of sales and use taxes by companies for school construction, and the appropriation of excess Federal Revenue Sharing Funds by the State Board of Education for critical school building needs.

Public safety. Local law enforcement agencies and fire departments have plans to expand services if funds become available. Beaver County has proposed to establish two special taxing districts to provide revenue for fire protection. This would allow for the purchase of new equipment.

Primary medical care. The two medical care clinics in Beaver County have assessed present and projected physician needs, and have indicated that they will be prepared to expand personnel and services as needed.

Housing. County and city officials plan to control the development of new residential areas and direct the growth of multi-family and trailer units to meet the long-term as well as short-term needs. Milford has initiated plans to identify potential housing development firms and measure their capabilities in order to determine the feasibility of building the needed housing within the development time schedule. There are plans to work with financial institutions to aid in credit availability. Milford has adopted zoning subdivision and mobile home ordinances, and the 1973 Uniform Building Code. Beaver City has adopted a mobile home ordinance and the 1973 Uniform Building Code.

MEASURES COMMITTED BY THE APPLICANT

1. Dust from construction traffic would be controlled by water sprinkling.
2. Unauthorized cross-country travel by employees and creation of roads other than those approved would be strictly prohibited.
3. To prevent mixing and burial, top soil would be stockpiled where possible to be used in backfilling, covering, and grading road cuts and fills.
4. After major construction activities are completed, disturbed areas on BLM rights-of-way would be revegetated and maintained to include palatable species to provide forage for livestock and wildlife. Water pipeline and buried cable rights-of-way would be revegetated with shallow-rooted species that would not interfere with operations.
5. Vegetation on temporary access roads and temporary use areas would be restored, as practicable.

6. Disturbed surfaces would be graded and/or cultivated (irrigated and fertilized) and would be revegetated to provide forage for livestock and wildlife.

7. Wherever possible, clearing would emphasize crushing or cutting of brush rather than uprooting.

8. A program of ongoing research in revegetation studies would be carried out to select the most appropriate species to restore disturbed lands to a productive status.

9. In the event any archaeological remains are discovered during construction or mining activities, those remains would be left undisturbed pending inspection by a BLM-approved expert.

10. Unobtrusive colors in paint and materials which would blend with the surrounding landscape would be used on buildings, smokestacks, and fences. Structures and facilities would not be located on the skyline.

11. Planning assistance would be given to local communities which would be affected by the increased population in an attempt to reduce the boom town effects of the proposal.

EVALUATION OF MITIGATING MEASURES

The effectiveness of the mitigating measures committed by government agencies is evaluated in this section. The effectiveness and feasibility of mitigating measures committed by the applicant are also evaluated. Applicant-committed mitigating measures are evaluated with the expectation that they would be implemented.

The discussion of effectiveness shows the relation of mitigating measures to changes in duration, intensity, incidence, and magnitude of impacts described in Chapter 3.

Air quality. The mitigating measure that would require sprinkling of roads as directed by BLM and U.S. Geological Survey would reduce the amount of fugitive dust from about 2.5 miles of mine development roads and the 6.6-mile mine access road. Because of a lack of data, no estimate of the amount of fugitive dust from this source has been made, and the significance of the reduction cannot be established.

Topography. None of the mitigating measures listed are concerned with mitigation of significant impacts to topography. The grading of construction sites back to a form compatible with the surrounding topography would mitigate impacts that are insignificant in comparison with the topographic impacts that result from the proposed action.

Hydrology. The proposed improvement to community sewage systems to handle the increased populations would eliminate the possibility of impacts to ground water quality from improperly treated sewage.

Soils. General mitigating measures to reestablish vegetative cover on disturbed areas not occupied by project components have been proposed. Complete removal of soil at the mine area, coupled with the fact that the mine area and waste dump would be composed of solid rock, would create a situation where there would be almost no chance of revegetating these areas.

The potential for artificial revegetation of disturbed soil in the processing plant complex area is low because precipitation (6 to 10 inches per year) is not adequate for seed germination and establishment of plants by known artificial methods. Considerable research has already been done on the artificial revegetation of disturbed soils in areas with low precipitation with very little success. It is not anticipated that the research program proposed by the applicant would provide new methods that would enable disturbed areas to be artificially revegetated with a reasonable chance of success. The vegetative cover on these areas would most likely be reestablished by natural plant succession over a 15 to 20-year period and the proposed mitigating measures would not be effective in reducing impacts to soils.

The mitigating measure that would restrict scalping of topsoil to specified areas and restricting cross-country travel would not effectively mitigate soil impacts. The primary value of these measures would be to ensure that soil impacts, in addition to those described in Chapter 3, do not occur.

The stockpiling of topsoil to be used in backfilling material sites and road cuts and fills would significantly mitigate the adverse impacts to soils. However, only approximately 131 acres or about 5 percent of the 2,409 acres that would be disturbed by the proposed project could be treated in this way and this mitigating measure would have only localized significance. The mitigating measure that would require crushing or cutting of brush and trees would effectively reduce soil disturbance in clearing operations in all vegetation communities that would be affected by the proposed action. However, at least 85 percent of the 2,409 acres that would be disturbed would be occupied by project components during the 25-year project life and soils would be completely buried or removed in the case of the mining operation and tailings ponds.

Vegetation. The mitigating measures to revegetate disturbed areas in Wah Wah Valley (processing plant complex, transportation system, water system, and material sites) by artificial means would not be effective in mitigating the impacts to vegetation. As discussed in the section on Soils, precipitation (6 to 10 inches per year) is not adequate for seed germination and the establishment of native or introduced plant species. Attempts in Utah by BLM and university researchers to artificially establish vegetation on undisturbed soils under similar climatic conditions have not been successful. Irrigation and the addition of fertilizer and soil amendments could be used to ensure the success of artificial revegetation. However, the significance of the impacts to vegetation would not justify the implementation of these measures. In addition, costs of the mitigation would likely preclude its implementation by the applicant. It is likely that original vegetation communities would be established on disturbed areas by natural plant succession over a 15 to 20-year period.

The measures to use brush blades instead of dirt blades would effectively reduce impacts to the mixed-shrub community by preserving native vegetation. However, the majority of the disturbed area (80 percent) in this community would be occupied by structures or roads during the project life and this reduction in vegetation disturbance would not be significant.

Wildlife and wild horses. The mitigating measure requiring the design of power lines to prevent the electrocution of raptors would be effective. Tailings ponds surrounded by a 6-foot net wire fence would be effective in keeping deer, antelope, and wild horses out of the tailings ponds and would eliminate the possibility of death or injury to these animals.

As discussed in the Soil and Vegetation sections of this chapter, it is not likely that the mitigating measures to restore vegetation by artificial means would be successful. Reestablishment of the vegetation necessary to restore the original wildlife habitat would probably depend on natural plant succession over a 15 to 20-year period.

Cultural resources

Historical. Excavation of the rock house and dugout would prevent uncontrolled loss of data through vandalism and natural deterioration, but would remove a certain amount of onsite data from future research opportunities.

Photographing and documenting the kilns would preserve a record of the state they are now in, but would not insure preservation or protection from vandalism and natural elements.

Photography and documentation of the cabin would serve to preserve a record of a resource that would be totally destroyed by the project.

Archaeology. Salvage of the conveyor and mine water system sites would serve to preserve data that would otherwise be lost. Salvage itself destroys sites and removes them from future research potential. However, uncontrolled loss is wholly unacceptable, while salvage provides a considerable amount of valuable data, both for current and future use.

Avoidance is not deemed viable in these areas as rerouting to avoid one site could simply serve to endanger another.

Testing of selected sites in Blawn Wash would serve mainly as an evaluation tool to assess the nature, extent, and value of the resources in the area. Judgments as to National Register potential and the degree of protection required can be predicated on these test evaluations. While individual sites may not meet National Register criteria, there is a possibility the area would be suitable as a district nomination. Testing would destroy small portions of sites, but would not appreciably reduce their research potential.

The presence of a professional archaeologist onsite during construction would greatly reduce the possibility of inadvertent destruction of sites, since he would be able to recognize a site almost immediately, thus reducing damage to a minimum.

Additional survey would serve to identify unknown sites and provide the opportunity for assessment, evaluation and avoidance. Should salvage be necessary, a site would be lost, but a significant portion of the data contained would be saved.

Aesthetics. The proposed mitigating measures to use unobtrusive colors in paint and materials and not locate structures on the skyline would be effective in reducing the intensity of visual impacts during the 25-year project life. These measures would apply to mine buildings, the microwave repeater site, water well pump houses, and some of the buildings and structures within the processing plant site. However, the reduction would not be significant when compared with the total visual impact of the proposed project.

Removal of all structures upon abandonment of the project would significantly reduce the visual impact. Only the mine and waste rock pile would be visible from Utah Highway 21.

Land use. The proposed mitigating measure to fence the tailings ponds would eliminate the possibility of livestock coming in contact with toxic chemicals or entrapment in tailings mud. Installation of cattleguards at approximate locations would reduce, but not eliminate, disturbance to livestock operations.

Socioeconomic conditions

General mitigation. Many problems which occur in rapid growth areas result from, or are aggravated by poor or untimely planning. The Beaver County Planning and Development Council has provided a timely, coordinated planning effort. In addition, the Council has generated local public involvement in the planning process. The planning efforts thus far have created an awareness of problems to be met and a preliminary assessment of alternatives available to deal with problems.

Final planning would depend on the certainty of the project's implementation, and would require additional commitments of funds and resources. A lag time is inherent between the time that funds are committed and the time that new services and facilities are operational. The Council has accomplished a desirable level of planning prior to growth, and this would shorten the lag time in implementing services if the project is undertaken.

Highways. There is not sufficient detail to evaluate the effectiveness of the plans.

Water supply. Milford has made commitments to improve the water storage facilities and it is assumed that they would be able to accomplish this goal. It is possible that a new storage system could be ready in time to meet the needs of the new population, but this would be dependent upon the length of time for bonding procedures, funding availability, and the ability to complete improvements within a strict time schedule. Plans have been completed for different levels of growth for Minersville, but funding has not been obtained for construction of facilities needed for the expected future growth. If funding is available in time to begin improvements, then the lag period when services were not available would be shortened. It is not known when funding would become available. The sale of water to finance needed improvements in Beaver would mitigate impacts since only a small amount of new population is expected to live in Beaver.

Sewage systems. Milford has made commitments to expand the sewer system, as indicated by the purchase of land with which to expand their lagoon, and the application for $20,000 in planning funds. These efforts are expected to successfully mitigate impacts. It is not possible to evaluate Minersville's sewage system plans since funding is not available. Beaver's plan to increase pumping capacity is expected to be successful in view of the small impact expected there.

Education. Although the Beaver County School District is not committed to carry out mitigating measures, it is expected that they would accomplish their plans.

Public safety. It is not known if the two proposed special districts for fire department revenues will be established. Establishment of the taxing districts would be expected to mitigate impacts. It is not known if funding would be available without these taxing districts.

Housing. If funding was available for Milford to begin large scale housing development, and if construction was completed on schedule, it would be possible to avoid adverse impacts. However, it is not known if these plans would be successful. Other mitigating measures would enhance the quality of available housing, but it is not known if these would be successfully carried out.

Primary medical care. It is not known if plans to recruit more physicians would be successful.

Land use plans and controls. Local officials have committed themselves to revising master plans and ordinances to facilitate orderly growth from the proposed project. The assistance of the applicant in providing information on potential socioeconomic impacts has already been used in preliminary planning efforts. The evaluation of the effectiveness of proposed changes in land use plans and controls is discussed in the Socioeconomic section of this chapter.

CHAPTER 5

ANY ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

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INTRODUCTION

The purpose of this chapter is to summarize the probable unavoidable impacts that would result should the proposal be implemented. Unavoidable adverse impacts are the residual impacts after application of the mitigating measures discussed in the previous chapter. The relative value placed on all unavoidable impacts and their significance are evaluated in this chapter. The approach to determining significance is the same as explained in the introduction to Chapter 3. The only difference is that the analysis of significance is for the impact remaining after mitigation. Where appropriate, unavoidable impacts are quantified in the same terms used in Chapter 3.

AIR QUALITY

Impacts of the proposed alunite project on air quality in the surrounding area are viewed in terms of state and federal air quality and emission standards, potential effects on plant and animal life and human health, and possible effects on the visual qualities of Wah Wah Valley. The impact of any pollutant on animals, vegetation, and man is determined by its concentration in the ambient air as well as length of time over which exposure occurs. Air quality standards, therefore, take into account exposures over a long term as well as over short terms of a day or less. Estimated pollution levels include calculation of expected annual average concentrations as well as maximum expected 24-hour or 3-hour averaged concentrations.

Emissions from processing complex. Emissions after abatement are listed together with the expected control efficiencies in table 5-1. Particulates can be controlled with baghouse filtering systems with efficiencies up to 99.6 percent. Electrostatic precipitators generally have efficiencies ranging from 97 to 99.5 percent. With present best available technology, wet lime scrubbers can attain a sulfur dioxide removal efficiency of 90 percent. Fluoride emissions can be controlled using wet scrubbers with efficiencies of up to about 99.5 percent. Control of nitrogen oxides with present technology is about 20 percent. Some additional control can be achieved by using special boiler designs. The abated emissions proposed would meet federal as well as state emission regulations.

The control efficiencies listed in table 5-1 would not be reached 100 percent of the time. There would be periods when actual emissions could be much higher due to occasional malfunctions in the control devices or processing systems. Control equipment also would not operate at full efficiency during shutdown or startup procedures. Electrostatic precipitators on large power plants such as the Navajo plant have operated at 97 percent availability. It is anticipated that operating availability for the electrostatic precipitator associated with the power plant would be about the same. Operating availability of lime scrubbers used on

Table 5-1. Summary of emissions, control efficiencies and control devices for proposed alunite main processing complex

	Emissions pounds per day		Control efficiency (percentage)	Control device
	Unabated	Abated		
Alunite primary crushing, conveying and storage				
Particulates	7,000	1,400	80	Settling, water sprays
Alunite fine grinding, crushing, handling				
Particulates	183,000	700	99.6	Baghouse
Alunite dehydration and oxidation				
Particulates	384,000	3,800	99	Scrubber
SO_2	566,000	22,800	96	Lime scrubber
NO_x	21,000	17,000	20	Scrubber
Sulfuric acid plant				
SO_2	12,000	2,400	80	Lime scrubber
Potassium sulfate				
Particulates	52,000	350	99	Baghouse
Alumina calcining				
Particulates	50,000	500	99	Scrubber, baghouse
SO_2	16,000	3,200	80	Lime scrubber
NO_x	6,000	4,800	20	Scrubber
Alumina storage and shipping				
Particulates	60,000	250	99.6	Baghouse
Phosphate rock handling storage, grinding				
Particulates	136,000	550	99.6	Baghouse
Phosphoric acid plant				
Fluorides[b]	4,400	20	99.5	Cross flow scrubber
GTSP/MAP/DAP plant				
Particulates[a]	312,000	1,550	99.5	Cross flow scrubber
Fluorides[b]	88,000	400	99.5	Cross flow scrubber
Ammonia	8,400	400	95	Acid scrubber
Aluminum fluoride				
Particulates[a]	300	3	99	Cross flow scrubber
Fluorides[b]	3,200	32	99	Cross flow scrubber
Aluminum fluoride storage and shipping				
Particulates[b]	62,000	250	99.6	Baghouse
Power plant				
Particulates	350,000	3,500	99	Scrubber, electrostatic precipitator
SO_2	95,000	9,500	90	Lime scrubber
NO_x	30,000	21,000	30	Scrubber

[a] Includes particulate fluorides
[b] Includes particulate and gaseous fluorides

recently constructed power plants is generally around 90 percent (EPA, 1974).

Potentially large amounts of particulates, sulfur dioxide, or fluorides (up to the unabated rates listed in table 5-1) could be released in case of control equipment failure. However, such cases would generally be short-lived since state air quality regulations require immediate rectification.

Even with the controls proposed in table 5-1, and 100 percent availability of pollution control devices, the proposed alunite plant would not meet Class II standards under the Prevention of Significant Deterioration Regulations. The maximum ground level concentrations predicted by modeling calculations are given in Table 5-2.

Fluoride levels would be potentially high in a small area southwest of the plant site. This area is too steep and rugged to be used by livestock or large wildlife species but could introduce hazards to some small resident mammals and reptiles. The area affected would be about 5 square miles in extent. It appears that even with prevailing southerly winds, long-term fluoride concentrations would not be high enough to be biologically significant north of the plant site in Wah Wah Valley.

Fugitive dust. It is difficult to assess effectiveness of the mitigating measures on dust control. During the construction phase, air quality in the immediate vicinity of the construction operation could be affected by fugitive dust during periods of high winds. During the operation phase, air quality around the mining areas or tailings ponds could be affected significantly by fugitive dusts. Under extreme wind

Table 5-2. Maximum calculated ground level pollution concentrations (micrograms per cubic meter) from Alunite stack emissions

	Calculated	Class II	Class III[a]
Sulfur dioxide			
Annual	78	15	80
Maximum 24-hour	290	100	365
Maximum 3-hour	1,160	700	1,300
Particulates			
Annual	29	10	60
Maximum 24-hour	76	30	150
Nitrogen oxides			
Annual	88	--	100
Fluorides			
Annual	1.0	--	--
Maximum 24-hour	2.7	--	--

[a] Utah Bureau of Air Quality proposes Class III designation for area. Class III allows deterioration up to the ambient air quality standards.

conditions federal and state ambient air quality standards for particulates could be exceeded in localized areas in the immediate vicinity of the tailings ponds and mine. Fugitive dusts from the tailings ponds could also have a significant impact for an indefinite period well beyond the life of the project. Background particulate levels in the area are already high and any disturbance in association with the proposed alunite project in Wah Wah Valley would compound the problem.

Visibility. There would be a slight reduction in visibility as a result of increased particulate levels, mainly in Wah Wah Valley. The stack plumes would only be visible in the valley from State Highway 21, a lightly traveled route. The water vapor plume from the power plant cooling tower would be visible during cold weather for only a short distance downwind from the plant.

Odors. Unpleasant odors due to sulfur dioxide emissions from the processing plant would occur only during short periods of extreme limited mixing or fumigation conditions within a few miles radius from the processing plant complex.

TOPOGRAPHY

The existing topographical features of the proposed site would be altered by the construction and operation of the alunite mine. The mining operation would remove a prominent ridge and produce a pit approximately 240 acres in size with a maximum depth of 450 feet. About 38 acres would be backfilled with waste rock creating a small hill.

The waste rock generated by the mining operation would raise the floor of a small canyon about 400 feet over a length of 1.5 miles to eventually create a long plateau. This waste rock pile would occupy 175 acres in addition to the 38 acres backfilled in the pit.

Dikes to form the gypsum and silica tailings ponds approximately 5 miles in length would reach heights from 80 to 120 feet. These ponds would cover a total of 1,250 acres.

Changes to topographic features would result from leveling areas within the processing plant complex to facilitate construction. Minor changes to topographic features would occur as a result of leveling areas prior to construction of the transportation system, ore conveyor system, and communication facilities. Shallow depressions or pits up to 10-feet deep would result from the mining of sand, gravel, and basalt.

HYDROLOGY

Ground water

Water quantity. Approximately 32 acre-feet of water per year would be withdrawn from bedrock aquifers in the Wah Wah Mountains to operate the alunite mine and related facilities. Withdrawing water for the mining operation would have a small, unmeasurable impact on the water supply. However, the 32 acre-feet per year withdrawn for the mining operation would be unavailable for other uses during the 25-year life of the project. Withdrawal of 32 acre-feet per year through the mine supply wells would reduce the natural ground water recharge to the valley ground water reservoir by about the same amount. This would result in approximately a 0.4 percent reduction in the annual estimated recharge (8,500 acre-feet) to the valley ground water reservoir.

Approximately 7,590 acre-feet of water per year would be used to operate the processing plant complex and related facilities. The water would be pumped from 10 to 20 wells tapping the Wah Wah Valley ground water reservoir. This water would be unavailable for other uses that might develop during the 25-year life of the proposed project. The withdrawal of 7,590 acre-feet per year of water from the Wah Wah Valley ground water reservoir would not exceed its estimated annual rate of recharge.

The proposed project would increase the total population in the Milford-Minersville-Beaver-Cedar City area by an estimated 4,500 people. This would increase total water supply requirements by an estimated 940,000 gallons per day (about 1,058 acre-feet per year), and total sewage loads by an estimated 470,000 gallons per day (approximately 530 acre-feet per year). These estimates are based on factors used by the Utah Division of Health to evaluate municipal water supply and waste-water treatment requirements. The city of Milford would receive most of the anticipated new residents, and would require the largest expansion of water supply and waste-water treatment facilities. The significance and projected expansion of municipal water supplies and waste-water treatment facilities are discussed in the Socioeconomic section. Ground water is available to accommodate the anticipated expansion but the expansion would increase the present mining of the ground water reservoir in the Milford area by approximately 1,000 acre-feet per year. The annual rate of withdrawal is estimated by the State Engineer to exceed the recharge rate by 10,000 acre-feet. The additional water use would increase the present mining rate of water 10 percent. At the present mining rate, it would take about 200 years to withdraw the water stored in the top 100 feet of the ground water reservoir (see Hydrology section of Chapter 2). The increased mining rate would shorten this period to about 180 years. This could cause the deepening of all wells in the valley sooner than would be required at the present withdrawal rate. One thousand acre-feet of water would support approximately 250 acres of irrigated cropland producing a gross agricultural income of $60,000 per year. This income would be lost if water was purchased from existing water users.

Water quality and use. It is estimated that about 300 acre-feet per year of fluid would seep from the silica sand tailings pond to the underlying valley ground water reservoir. Nearly all solid tailings that would accumulate in the silica sand tailings pond would consist of relatively insoluble silica (about 93 percent), alumina and iron oxide. It is unlikely that fluid seeping through those tailings to the valley ground water reservoir would dissolve sufficient amounts of these materials to significantly raise concentrations of these chemical compounds or their disassociative ions in the ground water.

The slurry solution that would enter the silica sand tailings pond would contain about 12 percent potassium sulfate, 5 percent sodium sulfate and 0.33 percent sodium hydroxide. It is assumed that roughly the same percentages of these compounds would occur in the fluid that would seep from the pond to the valley ground water reservoir. These percentages would decrease considerably as fluids seeping from the pond (about 300 acre-feet per year) mix with natural ground water recharge in the general area (several thousand acre-feet per year) and ground water in storage (more than 1 million acre-feet). Therefore, no significant decrease in ground water quality is anticipated.

Surface water

Water quantity. During the operation phase, impoundment of surface runoff in the pit area of the alunite mine and within the dikes of the tailings ponds would decrease annual runoff in Wah Wah Valley. The relatively impermeable surface of roads, railroads, parking areas, buildings, and processing plant facilities would increase surface runoff. The net change would be a reduction of 104 acre-feet per year in Wah Wah Valley and an additional 2 acre-feet per year in the Milford area. These changes represent about 1.4 percent of the annual surface runoff in Wah Wah Valley and 0.05 percent of the annual surface runoff in the Milford area. The effect on surface runoff would be negligible.

Water quality. Removal of vegetation and modification of the terrain during construction of the proposed project would increase sediment loads by an unknown amount in Willow and Quartz creeks during the 42-month construction period. It is unlikely that such increase would reduce the usefulness of the runoff as a source of water for livestock and wildlife, because even under natural conditions water in these intermittent streams carries a relatively high sediment load because of high-intensity storms that provide the stream flow. Sediment loads, both natural and induced by surface disturbance, would clog the stream beds and impede stream bed infiltration of runoff. This stream bed infiltration is an important source of natural recharge to the valley ground water reservoir and stream bed infiltration of water from Willow Creek could be reduced. The resulting reduction of ground water recharge induced by the project cannot be determined from available data. The best estimate is that it would reduce recharge to the valley ground water reservoir by less than 1 percent of the total annual recharge.

SOILS

Soils on 2,409 acres would be disturbed and buried by construction and operation of the proposed development. Approximately 131 acres could be rehabilitated after the construction phase. Productivity on the 131 acres would be lost for 5 to 10 years and reduced until natural plant cover is reestablished which could take 15 to 20 years.

Soils on the remaining 2,278 acres would either be occupied by project components or disturbed during construction activities and productivity would be reduced or destroyed during the 25-year lifetime of the project. Productive soil could not be restored on 573 of the 2,278 acres. The 415 acres that would be required for the mine and spoil pile would be solid rock and 158 acres would be occupied by physical structures.

Soil losses would occur as a result of wind and water erosion on all disturbed areas (2,409 acres) during construction (744 acres) and operation (1,665 acres) of the project (excluding area covered by buildings, pavement, etc.). Most evident would be airborne material from the tailings ponds during periods of high winds. The soil loss from wind and water erosion cannot be accurately quantified but soil loss from the entire 2,409 acres would probably not exceed 50.2 acre-feet during the 25-year project life. This soil would be deposited in the Wah Wah Valley floor and would not be of sufficient quantity to bury or destroy vegetative cover.

Additional area would be disturbed adjacent to the communities of Milford, Minersville, Beaver, and Cedar City by the increased off-road vehicle use that would occur from population increases. This disturbance would increase the potential for accelerated gully erosion resulting from concentrated off-road vehicle use of steep terrain. This additional impact would have only localized significance.

VEGETATION

Construction and operation of the proposed project would remove 2,409 acres of vegetation over a 25-year period of time. This total acreage includes 1,914 acres in the mixed shrub-grass community, 460 acres in the pinyon-juniper community, 20 acres in the shadscale community, and 15 acres in the revegetated community. These acreage figures represent 1 percent or less of the total area of these vegetative communities in Wah Wah Valley.

After construction, the revegetation process could begin on 131 acres (water pipelines and construction material sites). At project termination, an additional 1,705 acres could be revegetated. Vegetation on 573 acres (400 acres in the pinyon-juniper community, 158 acres in the mixed shrub-grass community, and 15 acres in the revegetated community) would be permanently lost. The 573 acres includes 158 acres which would be occupied by physical structures and 415 acres which would be covered by the alunite mine and waste rock pile. Artificial revegetation of the 131 acres after the construction phase and the 1,705 acres at project termination would probably not be successful. Revegetation of these areas would most likely be accomplished by natural plant succession and it is expected that reestablishment of original vegetation communities would take 15 to 20 years.

The disturbed areas in the mixed shrub-grass and shadscale communities would likely be invaded by halogeton. Halogeton is an annual weed which is poisonous to livestock, particularly sheep.

Increased populations in Milford, Minersville, Beaver, and Cedar City would result in greater use of adjacent lands by off-road vehicle (ORV) users. Concentrated ORV use during the presence of the increased population would crush vegetation and eventually result in the loss of forbs and grasses. Woody plants such as sagebrush and pinyon-juniper trees would likely survive such ORV use.

WILDLIFE AND WILD HORSES

Over a 25-year period of time, construction and operation of the proposed project would result in the eventual removal of 2,409 acres of vegetation, thereby eliminating it temporarily or permanently as wildlife and wild horse habitat. This figure includes 540 acres of deer habitat, 1,914 acres of antelope habitat, and 540 acres of wild horse habitat. All these acreages represent less than 1 percent of the total habitat available for these species in Wah Wah Valley and the surrounding mountains. At project termination, 1,836 acres of former wildlife habitat could be revegetated by natural processes. A total of 573 acres would be permanently lost for food and cover. Of this permanently lost area, 415 acres would be deer and wild horse habitat and 158 acres would be antelope habitat.

Habitat losses would force deer, antelope and wild horses onto surrounding habitat. This would increase competition during winter months but habitat loss would not result in loss of animals. Small rodents and reptiles would be eliminated by construction activities and loss of food by vegetation removal. Deer, antelope, and wild horses would move to adjacent habitat resulting in increased competition with wildlife and wild horses already using the habitat. It is estimated that no more than 30 deer would move out of the area affected onto adjacent habitat. Approximately 15 antelope and 29 wild horses would avoid the area and concentrate their use on adjacent habitat. Predator species (including raptors), rabbits, and birds would also avoid the area because of human activity and noise. The use of high explosives in the mining operation would cause animals to move even further from the project site to escape the noise of blasting.

Increased hunting and poaching which would likely occur during the 42-month construction and 25-year operation phases would add to the hunting pressure which could be another factor contributing to low deer populations in Utah. The extent that this would further contribute to the low deer population is unknown. However, because of the low deer population, any further increase in harvest would be locally significant. The same impacts would occur to the antelope herd in Wah Wah Valley. An increase in hunting pressure and poaching would likely contribute to a population decline. The extent of the impact cannot be predicted because of lack of data.

Power transmission structures offer an increased potential for indiscriminate shooting at raptors.

CULTURAL RESOURCES

Historical resources. Construction activities and the presence of the proposed project would cause a change in the historic setting of the charcoal kilns north of the project site and the rock house and dugout in Blawn Wash. Because of the damage and deterioration that have already occurred to the old townsites of Frisco and Newhouse, additional human activity would reduce the limited historic values that remain. The impact of increased human activity to the charcoal kilns and the rock house and dugout in Blawn Wash cannot be predicted since their historic values are unknown.

A small cabin would eventually be covered by waste rock from the alunite mine. This would result in the permanent loss of any modern history associated with this cabin.

No historic sites on or eligible for nomination to the National Register of Historic Places are known to occur in the area of concern.

Archaeological resources. Following required salvage operations, 27 known surface archaeological sites and a rockshelter on the project site would be altered or destroyed. These sites are thought to be primarily chipping grounds and transient camping areas. No data are available on the significance of archaeological sites in the area of concern. Therefore, no quantification can be made as to scientific values that might be lost. All archaeological sites have the potential for scientific value. Scientific evidence would be lost as a result of salvage of sites that would be disturbed by construction activities.

Salvage and testing presents a case of unavoidable adverse impacts. Data are preserved, sut sites or portions of sites are lost from the rapidly diminishing reservoir of resources available for future research using more refined techniques for the extraction and interpretation of data.

The increased population in adjacent communities and the work force (up to 1,800 construction employees followed by 1,000 operational employees) at the project site would significantly increase the level of such activities as random hunting for arrowheads and other artifacts throughout the area of concern. In the event specific sites were located by the work force, subsequent disturbance and collection would occur. The 2-mile area adjacent to the project site would be particularly vulnerable to such activities since it is known to contain at least 50 archaeological sites. A temporary construction camp for about 900 workers would be maintained at the project site and it is likely that these residents would spend considerable time exploring the adjacent area. This would intensify impacts to archaeological values during the life of the construction camp.

No archaeological sites on or known to be eligible for nomination to the National Register of Historic Places are known to occur in the area of concern.

AESTHETICS

Site preparation, construction activities, and operation of the alunite mine and processing plant would result in a change in natural appearance of 2,409 acres of land in the south end of Wah Wah Valley. Vegetation would be removed, soil disturbed, and man-made structures such as plant buildings, conveyor, storage tanks, power lines, roads, railroad spur, tailings pond dikes, smokestacks (26 with heights from 130 to 460 feet), and office buildings would become a visual intrusion in the south end of Wah Wah Valley. The 23 stacks over 200 feet in height would have to be lighted. Water vapor and smoke plumes would also be visible to a limited extent. The mine and waste rock pile would produce a visible scar in the Wah Wah Mountains near the processing plant. Dust from construction, mining, and traveling unpaved roads would be unavoidable. During stable weather conditions it is probable that the mountains surrounding Wah Wah Valley would be obscured by a light haze that would be caused by the increased particulate levels. Frequency and duration of these conditions cannot be predicted. The present tranquility of the southern end of Wah Wah Valley and adjacent mountains would be unavoidably changed by noise and activity of the mining and processing plant operation.

During the 25-year life of the project the tailings ponds would increase in size to 1,250 acres and dikes would attain heights of 80 to 120 feet, thereby increasing the visual impact. During periods of high winds, which are estimated to occur an average of 10 days per month, it is likely that large dust clouds would be produced from the dry surface of tailings ponds during the project life and up to 20 years after project termination. These dust clouds would obscure the mountains surrounding Wah Wah Valley and would reduce the open space effect of the valley floor by limiting visibility from portions of Utah Highway 21. The extent of this impact cannot be determined, but it is anticipated that significant reductions in visibility would occur in localized areas of Wah Wah Valley during the dust storms.

All these intrusions would be visible from the 15-mile portion of Utah Highway 21, a lightly used road with 80 percent of the traffic from local residents, 15 percent from heavy trucks, and 5 percent from out-of-state residents.

Upon abandonment of the project, the mine area and spoil pile would be a permanent change in the landscape. Light colored rock scars would be visible from Utah Highway 21. Approximately 80 percent of the processing plant complex could return to natural vegetation cover within 15 to 20 years. Paved parking areas, cement building foundations, and roads would probably be permanently occupied, disrupting the natural setting. There would be a slight deterioration of the scenic quality for the areas scarred by off-road vehicles near the communities receiving population increases.

LAND USE

Recreation

Fishing. The increase in population from the alunite project would result in increased fishing pressure and use of Utah State Park camping and fishing facilities at Minersville Reservoir. It is estimated that as many as 1,200 new fishermen would use Minersville Reservoir at least once a year. It is anticipated that the greatest increase in fishing pressure would occur during June when the heaviest fishing use normally occurs. During June of 1974, 15,295 people visited the reservoir which has an average size of 960 acres and a maximum size of 1,130 acres. The increased use by the new residents would contribute to the competition for the already limited camping and parking areas on unimproved areas adjacent to the reservoir. Additional competition for the use of the park boat ramp, fish cleaning station, and overflow parking areas would occur particularly during the peak fishing season. The increased visitation at the reservoir and the additional competition for available space and facilities would lower the quality of the recreational experience for many recreationists. As the fishing season progresses, the increased fishing pressure could lower the quality of fishing by depleting the supply of catchable fish. To maintain quality fishing throughout the season would require the Division of Wildlife Resources to make more frequent plantings; thereby adding to the cost of their fisheries' program. These impacts would occur during the 42-month construction period and throughout the 25-year life of the project.

Hunting. The loss of 540 acres of mule deer habitat, which is less than 1 percent of the habitat in the area of concern, and the noise and disturbance that would occur during the 42-month construction period and 25-year project life would cause deer to move into other portions of the Wah Wah Mountains. Hunting opportunities would not be significantly reduced, but would be redistributed. The increase in population would result in an estimated 765 new deer hunters. This increase represents approximately 0.4 percent of the total number of people who hunted deer in Utah during 1975 and would not produce a significant increase in hunting pressure over the state. The deer in the area of concern would be exposed to an unknown, but possibly significant increase in hunting pressure by new residents. The increased population would probably result in higher levels of poaching. Removal of additional deer by hunting and poaching would eventually affect the quality of the hunting experience as the hunter success ratio declines. The potential increase in both legal hunting and poaching could also require additional law enforcement surveillance by the Division of Wildlife Resources. Since the area of concern is estimated to provide about 2 percent of the deer hunting in Utah, this decrease in the quality of hunting would be a localized impact and would not be significant on a state-wide basis.

Increased poaching of antelope by new residents would reduce the number of huntable animals. The extent of the increase in poaching cannot be determined because of a lack of data. However, a significant reduction in the antelope population in Wah Wah Valley would reduce the quality of antelope hunting by making it more difficult to find shootable animals. A significant decrease in antelope numbers in Wah Wah Valley could also result in the issuance of fewer antelope permits by the Division of Wildlife Resources.

Collecting. The increased collection of smoky quartz in the Mineral Mountains by new residents would make it more difficult for collectors to find this relatively scarce, semi-precious gem. The quality of the rockhounding experience would gradually decline throughout the 25-year life of the project as the number of easily found specimens of smoky quartz decreased.

Sightseeing. Adverse impacts on sightseeing that would result from the proposed project are discussed in the Aesthetics section of this chapter.

Off-road vehicle use. The adverse impacts associated with the additional disturbance by ORV use are discussed in the Soils, Vegetation, Wildlife, and Cultural resources sections of this chapter. An increased number of complaints to law enforcement agencies by residents of impacted communities about trespassing and noise would result from the increased ORV use.

Agricultural. The removal of 2,409 acres of vegetation during the 42-month construction phase and 25-year operation phase of the proposed project would result in the eventual loss of 193 animal unit months (AUMs). The major impact would be to the operator of the Willow Creek Allotment. As a result of the removal of 1,719 acres of vegetation, this allotment would lose 3 percent (156 AUMs) of its present grazing capacity. This could require a reduction in the rancher's livestock numbers. This same rancher would be subject to the loss of an additional 5 percent (269 AUMs) of his federal grazing privileges in the Willow Creek Allotment as a result of the proposed transfer of 5,298 acres of national resource land to the state. Combining the two figures results in a potential loss of 8 percent (425 AUMs) of the present licensed use in the allotment.

The loss of vegetation as described in the Vegetation section would be a permanent loss of 415 acres (17 AUMs) in the Bucket Ranch Allotment and 158 acres (15 AUMs) in the Willow Creek Allotment. The permanent loss in the Bucket Ranch Allotment would be less than 1 percent of the total and the permanent loss in the Willow Creek Allotment would also be less than 1 percent.

Increased disturbance to livestock and vandalism to livestock handling facilities in Wah Wah Valley would occur with the introduction of a large work force at the project site and the increased population in nearby communities. This impact would cause significant economic impacts to the five ranchers who would be affected because of the increased expenditures that would be required for maintenance of facilities and supervision of grazing animals. The increased traffic rate on Utah Highway 21, the 9-mile access highway, and the 21-mile railroad spur would result in increased losses of animals from traffic accidents. The number of livestock lost from rustling would also increase. The extent of these losses cannot be accurately predicted but any increase in livestock losses would be a significant economic loss to the rancher because of the replacement cost of livestock. These impacts would occur during the 42-month construction period and the 25-year project life.

Transportation. Increased traffic rate (up to 825 vehicles per day) on Utah Highway 21 would require increased expenditures for maintenance. These increased maintenance costs cannot be projected until actual traffic rates are established but these costs would be highest during the 42-month construction phase and would continue throughout the 25-year project life.

Motorists on the access highway would be subject to injury, death, and property damage as a result of accidents with range livestock. The increased rate cannot be predicted because of a lack of data.

Urban/residential land use. Approximately 300 acres of land would be required for the establishment of new residential dwellings in Beaver and Iron counties. Most of this development would occur on unproductive private lands within the city limits and adjacent to the city of Milford. A small portion of the residential expansion could occur on agricultural cropland primarily in Beaver County. The amount of cropland that would be lost is not considered to be significant since the entire 300 acres represents less than 1 percent of the cropland in Beaver County. If all the residential expansion occurred on cropland there would be an annual loss of $72,000 in gross agricultural income to Beaver County (assuming 4 tons of alfalfa hay per acre at $60 per ton).

Mineral development. The proposed project would prevent the development of at least two mining claims located by other individuals on the project site. The mineral character and potential value of these claims have not been established.

SOCIOECONOMIC CONDITIONS

Population. The Milford-Minersville area would grow at a rapid rate for several years. The new population would not be an adverse impact in itself, but the resulting boom town situation could be the cause of adverse impacts. Increased demands resulting from the new population could lead to housing shortages, lack of goods and services, and a lower quality of life.

Employment. A lack of people to fill new nonbasic jobs to provide goods and services could create adverse impacts. The process of filling nonbasic jobs would require several years' lag time and goods and services would not be adequate for the increased population. This would lead to the same impacts discussed in Population above.

As an employer of 1,000 persons, the alunite mine and processing plant would become a major employer in the Beaver County area. This would make the area susceptible to changes in employment levels, shutdowns, layoffs, or strikes that might occur. Any substantial decrease in the employment level at the alunite project would make Milford a depressed area, unless other employment opportunities were available.

Infrastructures

Transportation. There would be greatly increased traffic flows in and around Milford. Project workers would have to travel through Milford and west on Highway 21 to reach the project site. Additional population would increase traffic flows in Milford, where there is an existing congestion problem. Residents would be subject to significantly increased noise levels from vehicular traffic. Specific plans to mitigate traffic congestion have been made, but a schedule for funding and construction has not been established, and Milford would experience a significant increase in traffic congestion if the planned highway improvements were not completed prior to project implementation. Prior to plant construction, U-21 would have to be resurfaced to accommodate the increased traffic from Milford to the project site. This resurfacing job would cost about $900,000.

Public utilities

Water. Milford's existing water storage facility would be inadequate to serve the new population. After certainty of the alunite project has been determined, a new storage facility will be planned to accommodate expected future growth. It is possible that improvements could be ready in time to meet the needs of the new population, but it is not known whether or not this would occur. If a new system is not ready, there would be inadequate storage until the new system was operational. It is not known how Milford would handle this problem, should it occur.

Minersville's water storage and distribution systems would be inadequate to serve the expected new population. Improvements necessary for alunite-related growth have been planned, and if the alunite development occurs, Minersville would be able to begin design planning to increase capacity. It is possible that improvements could be completed in time to meet the needs of the new population, but it is not known whether or not this would occur. If improvements were not completed in time, there would be inadequate storage until the improvements were completed.

Sewage systems. Minersville has an existing problem with individual septic tanks. A lagoon system will be built if funding becomes available, in which case enlargements to the system would be the only requirement to meet new growth. If funding is not available, sewage disposal problems would be a limiting factor to growth, causing more people to live in Milford.

Education. In the event that planned mitigating measures are not carried out, or if growth occurred faster than expected, schools could become overcrowded, resulting in a lowered quality of education.

Public safety. There would be a need for additional personnel and equipment for local law enforcement agencies in Milford and Minersville as a result of the new population. Any expansion would be dependent on the availability of additional funds. If these funds were not available, inadequate police protection would result. If the two proposed special taxing districts are implemented to provide a tax base for fire protection, no adverse impacts would result. Without this revenue source, inadequate funding and a lack of fire control equipment could result.

Primary medical care. The Milford-Minersville area would need several new physicians. It is not known if plans to recruit new physicians would be successful. If new physicians are not available, a shortage could result causing area residents to travel further for medical attention.

Housing. There would be greatly increased demand for housing in the Milford-Minersville area. Six to seven hundred housing units would be needed in Milford during the peak construction phase, and an additional 400 to 500 units would be needed when the full operating level was reached. If Milford receives the necessary funding to proceed with large-scale housing development and if construction was on schedule, major adverse impacts to housing in the Milford area could be avoided. If these plans are not successful, adverse impacts could occur, including substandard housing and crowded mobile home parks. Thus, the degree of success achieved by Milford in their housing development program would determine the severity of impacts to housing in the area.

Demand for housing in Minersville is expected to be 40 to 80 units during the peak construction phase, with an additional 40 to 60 units needed at the full operating level. Since there are no mitigating measures planned in Minersville, substandard housing and crowded mobile home parks could result here as well.

Quality of life. There would be no mitigating measures to specifically reduce impacts to quality of life, but the severity and duration of impacts to quality of life would depend on the effectiveness of planned mitigating measures for utilities, education, public safety, primary medical care, and housing. A degraded quality of life would probably occur initially, before mitigating measures and new services become effective. After mitigating measures were applied to utilities, education, public safety, primary medical care, and housing, their effectiveness would help determine the impacts to quality of life. A substantial portion of the impacts could be unavoidable.

Community homogeneity. The degree of community homogeneity in the Milford-Minersville area could be lessened as a result of the new population. The new population could tend to be more culturally and racially heterogeneous with different traditions, attitudes, and behavior patterns.

Public attitudes. Milford-Minersville residents could become less satisfied with their communities as a result of the new population. Successful mitigating measures to reduce impacts to quality of life would tend to lessen this impact, but there are no specific mitigating measures proposed for this impact.

Availability of goods and services. The lack of goods and services expected in the Milford area would cause a significant adverse impact to quality of life. It would take several years for new stores and services to develop at a level to serve the additional population. Increased prices of available goods and services would be an adverse impact to residents whose incomes remain the same, leaving them less able to afford goods and services. Community strain in trying to accommodate the new level of demand could also result. Signs of community strain might be increased rates of divorce, family instability, alcoholism, crime, mental illness, suicide, and attempted suicide. Housing shortages could cause temporary housing (often substandard) to be used permanently. The development of fringe settlements outside existing communities might also be expected. People living in these fringe settlements have been found to be less integrated into the community and to participate less in community activities.

Table 5-3 summarizes unavoidable adverse impacts for all environmental components.

Table 5-3. Summary of unavoidable adverse impacts

Air quality

1. Increased particulate levels in ambient air.

2. Increased sulfur dioxide levels in ambient air.

3. Increased nitrogen oxide levels in ambient air.

4. Increased fluoride levels in ambient air.

5. Additional sources of fugitive dust adding to high background levels of particulates in the south end of Wah Wah Valley.

6. Slight reduction in visibility in Wah Wah Valley.

Topography

1. Removal of a prominent ridge to create a pit approximately 240 acres in size with a maximum depth of 450 feet.

2. Creation of a 175-acre waste rock pile in a narrow canyon with an average height of 400 feet over a length of 1.5 miles.

3. Tailings pond dikes 80 to 120 feet high with a total length of approximately 5 miles.

4. Changes to topographic features resulting from leveling of construction sites.

5. Shallow depressions or pits up to 10 feet deep resulting from the mining of sand, gravel, and basalt.

Hydrology

1. Use of 32 acre-feet of water per year from bedrock aquifers in the Wah Wah Mountains.

2. Use of 7,590 acre-feet of water per year from the Wah Wah Valley ground water reservoir.

3. Increased mining of water (1,000 acre-feet per year) from Escalante Valley ground water reservoir or loss of agricultural production from 250 acres of irrigated cropland.

(continued)

Table 5-3 (continued)

4. Seepage of about 300 acre-feet of fluid from silica tailings pond to Wah Wah Valley ground water reservoir resulting in slight decrease in water quality.

5. Reduction of surface runoff in Wah Wah Valley by 1.4 percent and increase in surface runoff in Milford area by 0.05 percent.

6. Increase in sediment loads in intermittent streams during the construction phase.

7. Slight reduction in natural recharge of water to the Wah Wah Valley ground water reservoir.

Soils and vegetation

1. Soils and vegetation on 2,409 acres would be disturbed and buried by construction and operation of the proposed project.

2. Productive soil and vegetation could not be restored on 573 of the 2,409 acres.

3. Soil losses from wind and water erosion of up to 50.2 acre-feet during the project life.

4. Disturbance of soil and vegetation by increased off-road vehicle use.

Wildlife and wild horses

1. Removal of 2,409 acres of vegetation would result in the loss of 540 acres of deer habitat, 1,914 acres of antelope habitat, and 540 acres of wild horse habitat.

2. Permanent loss of vegetation on 573 acres would result in the permanent loss of 415 acres of deer and wild horse habitat, and 158 acres of antelope habitat.

3. Deer, antelope, and wild horses displaced by habitat losses would move to surrounding habitat resulting in increased competition with animals already present.

4. Small rodents and reptiles would be eliminated by construction activities and loss of food by vegetation removal.

5. All wildlife species would avoid the project area because of the human activity and noise.

(continued)

Table 5-3 (continued)

6. Increased hunting and poaching of deer and antelope would likely contribute to a population decline for these species.
7. Power transmission structures would offer an increased potential for indiscriminate shooting at raptors.

Cultural resources

1. Presence of project would cause a change in historic setting and increase the adverse impacts of human activity on historic sites in Wah Wah Valley.
2. A small cabin of recent origin would be covered by waste rock from the alunite mine.
3. Twenty-seven known archaeological sites and a rockshelter would be altered or destroyed following required salvage operations.
4. Scientific evidence would be lost as a result of salvage of sites.
5. The increased population would significantly increase the level of such activities as random hunting for arrowheads and other artifacts throughout the area of concern. Disturbance and collection of artifacts by construction workers from specific sites in areas adjacent to the project site would occur.

Aesthetics

1. Site preparation, construction activities and operation of the alunite mine and processing plant would change the natural appearance of 2,409 acres of land in the south end of Wah Wah Valley.
2. Dust from construction, mining, and traveling unpaved roads would be visible from Highway 21. Large dust clouds would be produced from the dry surface of the tailings ponds. Significant reductions in visibility would occur in localized areas of Wah Wah Valley during periods of high winds.
3. The present tranquility of the southern end of Wah Wah Valley would be changed by the noise and activity of the mining and processing plant operation.
4. Paved parking areas, cement building foundations, the alunite mine, waste rock pile, and roads would be permanently occupied, causing a permanent disruption to the natural setting.

(continued)

Table 5-3 (continued)

5. There would be a slight deterioration of scenic quality for the 20 acres scarred by increased off-road vehicle use.

Land use

1. There would be increased fishing pressure and use of existing facilities at Minersville Reservoir.

2. The Division of Wildlife Resources would have to make more frequent planting of fish to maintain quality fishing through the season.

3. Hunting opportunities for deer and antelope in Wah Wah Valley would be redistributed as a result of the habitat loss and disturbance of the proposed project.

4. The increase in hunting pressure and poaching would eventually affect the quality of the hunting experience as the hunter success rates decline.

5. The quality of the rockhounding experience would gradually decline throughout the 25-year life of the project as the number of easily found specimens of smoky quartz in the Mineral Mountains decreased.

6. There would be an increased number of complaints to law enforcement agencies by residents of impacted communities about trespassing and noise resulting from increased ORV use.

7. Removal of 2,409 acres of vegetation during the project life would result in the loss of 193 animal unit months (AUMs) of grazing forage. The permanent loss of 573 of the 2,409 acres would result in the permanent loss of 32 AUMs. An additional 269 animal unit months of federal grazing privilege would be lost as a result of the proposed transfer of 5,298 acres to the state.

8. Increased disturbance to livestock and vandalism to livestock handling facilities in Wah Wah Valley would occur.

9. Increased traffic rates would result in increased loss of grazing animals from traffic accidents.

10. Increased traffic on State Highway 21 would result in increased maintenance costs.

11. Motorists would be subject to injury, death, and property damage as a result of accidents with range livestock.

(continued)

Table 5-3 (concluded)

12. Residential development on up to 300 acres of agricultural cropland would result in loss of agricultural income.

13. The development of at least two mining claims located by other individuals on the project site with unknown mineral values would be precluded by the proposed project.

Socioeconomic

1. A boom town situation would develop in the Milford-Minersville area. Increased demands resulting from the new population would lead to housing shortages, lack of goods and services, and a lower quality of life.

2. Beaver County would be susceptible to economic depression resulting from changes in employment levels at the alunite project.

3. There would be increased traffic congestion and noise levels in Milford.

4. Water systems in Milford and Minersville would be inadequate until improvements are completed.

5. The sewage system in Minersville would be inadequate and without a new system, sewage disposal problems would be a limiting factor to growth causing more people to live in Milford.

6. Schools could be overcrowded, resulting in a lowered quality of education.

7. Police and fire protection in Milford and Minersville could be inadequate.

8. A shortage of physicians could result causing area residents to travel farther for medical attention.

9. The degree of community homogeneity in the Milford-Minersville area could be lessened.

10. Milford and Minersville residents could becomes less satisfied with their communities.

LAND USE PLANS AND CONTROLS

The mitigating measures to be implemented by federal and local officials would effectively mitigate the adverse impacts on land use plans and controls.

CHAPTER 6

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

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INTRODUCTION

This chapter evaluates trade offs between short-term commitments of the environment which would result from the proposed alunite development in relation to the long-term maintenance and availability of environmental values. Discussions on the reduction in the range of alternative long-term opportunities which would result from short-term use of the environment are also included. Environmental consequences to present and future generations are shown. The cumulative long-term impacts of this action are combined with similar socioeconomic impacts which would result from geothermal development.

Short term is defined as the period in which construction, operation, abandonment and reclamation of the proposed project would take place. The proposed life of the project is 25 years. Abandonment, salvage and reclamation would require an additional, undetermined amount of time. Even though the proposed project would have an anticipated life of 25 years, it is viewed as a pilot project and, if successful, would possibly lead to larger scale development in the same area. In this event, the short term would be extended considerably, probably for 75 to 100 years. Long term refers to the length of time that both direct and indirect impacts generated by the proposal and its associated activities would continue.

Development of the alunite project would result in the introduction of: an open pit mine, an ore conveyor system, buildings, roads, a railroad, transmission lines, pipelines, a water well field, areas for the stockpiling of materials, tailings ponds, and material borrow areas.

The short-term development and use of the area's resources during the 25 years of alunite processing would alter the long-term productivity of the natural resources in the area of concern. An extension of the life of the proposal would result in a continual influence on the overall productivity of the area for 75 to 100 years.

The major change would occur in Wah Wah Valley, specifically in the vicinity of the alunite mine and processing plant locations. This portion of Wah Wah Valley would be transformed from an undeveloped area into an industrialized complex for conversion of alunite ore and phosphate rock into alumina, potassium sulfate, phosphate fertilizers, and aluminum fluoride. Construction of the linear project components would create changes over a wider area but the effect would not be as significant in terms of ecological relationships. After the proposed 42-month construction period, and during the 25-year project life, 2,715 acres of land would be disturbed, with 883 of these acres permanently occupied by facilities associated with the project.

Man's presence would be abundantly evident in the south end of Wah Wah Valley. Man would be more numerous, with a population increase in Beaver and Iron counties of 4,600, all of which would be directly and indirectly attributable to the alunite development. By 1985, the geothermal development could result in an additional population increase of 250 people in this two-county area.

The short-term beneficial impacts of the proposed alunite development would come from the production of alumina, potassium sulfate fertilizers, and phosphate fertilizers. Alumina would be the principal product from the proposed development. Currently, approximately 88 percent of all aluminum needs are supplied by imported bauxite and alumina. At the proposed production rate of 500,000 tons per year, the proposed development would provide approximately 5.7 percent of the nation's 1974 alumina needs. This would be accomplished using a new raw material source (alunite) which is thought to be abundant in the United States. Production of 370,000 tons per year of potassium sulfate fertilizer for domestic or foreign use is proposed. The bulk of domestic potassium fertilizer is produced as potassium chloride. Potassium sulfate has a higher unit value of potassium than the chloride compound and potassium sulfate is preferred as a fertilizer due to the adverse effects of the chloride ion on plant growth and water salinity. The proposed development would produce up to 1.1 million tons per year of granular triple superphosphate fertilizer and up to 605,000 tons per year of ammonium phosphate fertilizers. Phosphorous is one of the essential elements for plant growth and phosphate fertilizers are used extensively in the United States and foreign countries. Much of the new capacity for producing phosphate fertilizer in this country is intended to produce products for export. Up to 20,000 tons per year of aluminum fluoride would be produced each year. Aluminum fluoride is used in the aluminum smelting industry.

The relationship between the short-term use and the long-term productivity of each environmental component is discussed in the following sections.

AIR QUALITY

The sulfates, nitrates, fluorides, and various particulate compounds released to the atmosphere from the processing plant complex would have potential long-term effects on soils, plants, and animals. Pathways through the ecosystem of these elements have not been clearly defined and the long-term cumulative effect is not known.

Because of the proposed location, climatic conditions, and topographic features, emissions from the alunite processing plant are not expected to be cumulative with other potential emission sources. However, use of the ambient air by the alunite project would preclude the development of similar processing operations in the area of concern defined in Chapter 2. The proposed action would meet Class III Environmental Protection Agency Significant Deterioration Regulations standards but short-term concentrations of sulfur dioxide and particulates would use significant portions of the incremental increase allowed and there would be limited latitude for additional deterioration of air quality. This situation would not affect the long-term productivity of the environment since the air would be available for other industrial developments after shutdown of the alunite processing plant.

WATER RESOURCES

The processing plant and mine operations would use and consume an estimated 7,622 acre-feet of water from the Wah Wah Valley ground water system each year (7,590 acre-feet for the processing complex and 32 acre-feet for the mine). Use of this water would preclude its use for any other purpose during the short term. This 7,622 acre-feet of water would support approximately 1,900 acres of irrigated cropland (4 acre-feet per acre) or could support a population of about 35,000 people. The amount of water withdrawn from the ground water system would not exceed the estimated annual recharge rate of 8,500 acre-feet and there would be no effect on the long-term productivity of the ground water system.

Domestic water requirements for the increased population from the alunite project and geothermal development would increase the mining rate of water in the Milford area by about 1,000 acre-feet per year. The present annual rate of withdrawal is estimated to exceed the recharge rate by 10,000 acre-feet. At the present mining rate, it would take about 200 years to withdraw the water stored in the top 100 feet of the ground water reservoir. The increased mining rate would shorten this period to about 180 years. One thousand acre-feet of water would support approximately 250 acres of irrigated cropland producing a gross agricultural income of $60,000 per year. This income is insignificant when compared with the personal incomes and tax revenues that would be generated by using the water to support the population increase associated with the alunite project and geothermal development. It is expected that this increased requirement for domestic water would continue beyond the life of the alunite project, and the long-term potential productivity of 250 acres of cropland would be permanently eliminated.

SOILS

Long-term soil productivity would be lowered by the project even after abandonment. Reclamation of soils on disturbed areas would have to be accomplished by natural means and reestablishment of soil productivity to current levels would be slow due to the semiarid climatic conditions.

Soil productivity would be reduced or eliminated on 2,409 acres occupied by project components during the project life and beyond. Restoration could begin on approximately 131 acres of this total after the construction phase. Productivity of this 131 acres would be lost for 5 to 10 years and reduced for a period of up to 20 years. Soils on the remaining 2,278 acres would either be occupied by project components or disturbed during construction activities and productivity would be reduced or destroyed. Productive soil could not be restored on 573 acres within the foreseeable future because these areas would be covered with solid rock or permanently occupied by structures.

The trade off between short-term use and long-term loss of soil productivity cannot be quantified with available data. If not used for the alunite development, this soil would continue to produce forage for livestock and habitat for wildlife.

MINERALS

In the short term, use of alunite as a domestic source of alumina would help reduce the dependence of the United States on foreign sources. Development and implementation of the technology to economically process alunite would lead to the development of other alunite ore bodies and further reduce the Nation's dependence on foreign sources of alumina. According to the applicant, there are vast quantities of alunite in the United States so it is assumed that alunite reserves would not be depleted for several hundred years.

Use of coal for power generation and for process heat would save other fossil fuels in short supply and may help provide additional lead time for research, development, and increased long-term productivity of alternate energy sources such as solar energy and wind. Use of up to 1.15 million tons of coal per year at the alunite plant would replace the use of approximately 1.6 million barrels of crude oil. Domestically produced crude oil is in short supply. However, use of coal under present mining constraints could result in recovery of only 50 percent. Considerably higher recovery rates could be scheduled depending on the mining method. Future technological advances could result in higher recovery rates and mining coal with present technology could result in a reduction of long-term productivity. However, waiting until higher coal recovery techniques are developed is not a logical alternative to initiating the production of a domestic source of alumina.

In addition to the coal requirements, up to 25 million gallons of fuel oil would be required for processing the alunite ore. Use of this oil would add to the long-term depletion of oil reserves, but the use of this oil would enable the United States to develop a domestic source of alumina.

The short-term use of sand, gravel, basalt, and limestone would be required for the construction and operation of the alunite development. Over the long term, the minerals extracted would not be available for other uses. However, remaining reserves would be adequate to meet anticipated needs in the foreseeable future.

Alunite mining would preclude the development of other minerals in the mine area. At least two mining claims have been located in this area by other individuals. The potential mineral value of these claims has not been established and the effect on long-term productivity cannot be determined.

VEGETATION

Short and long-term vegetative productivity would be reduced by the proposed alunite development. Long-term productivity would be affected by permanent removal of vegetation by project facilities. Vegetation on temporarily disturbed areas would be restored, but the time required to return to current productive levels would extend beyond the 25-year project life and would affect the long-term productivity.

Construction and operation of the proposed project would remove 2,409 acres of vegetation over a 25-year period of time. This total acreage includes 1,914 acres in the mixed shrub-grass community, 460 acres in the pinyon-juniper community, 20 acres in the shadscale community, and 15 acres in the revegetated community. This vegetation currently supports a wide and diverse range of animal life.

After construction, the revegetation process could begin on 131 acres (water pipelines and construction material sites). At project termination, an additional 1,705 acres could be revegetated. Vegetation on 573 acres (400 acres in the pinyon-juniper community, 158 acres in the mixed shrub-grass community, and 15 acres in the revegetated community) would be permanently lost. Revegetation of the temporarily disturbed areas (1,836 acres) would most likely be accomplished by natural plant succession and it is expected that reestablishment of original vegetation communities would take 15 to 20 years. Loss of this vegetation would lower the productive level of the area over the long term for wildlife and livestock grazing in exchange for production of alumina, potassium sulfate, phosphate fertilizers, and aluminum fluoride.

Long-term vegetative productivity may be affected by processing plant emissions. Deposition of particulates, sulfur oxides, nitrogen oxides, and fluorides on vegetation may reduce density and cause changes in plant composition. Such long-term effects are not anticipated, but the effect of emissions on vegetation is not well defined at the present time and the potential effects, however remote, should be recognized.

WILDLIFE AND WILD HORSES

The short-term development of the alunite mine and processing plant complex would result in the removal of 2,409 acres of vegetation. The long-term productivity of 540 acres of deer habitat, 1,914 acres of antelope habitat, and 540 acres of wild horse habitat would be affected. At project termination, 1,836 acres of former wildlife habitat could begin revegetation by natural processes. This natural restoration would probably take 15 to 20 years. A total of 573 acres would be permanently lost for food and cover (415 acres of deer and wild horse habitat, and 158 acres of antelope habitat). Loss of this wildlife habitat would reduce the productive level of the area over the long term for wildlife in return for production of alumina, potassium sulfate, phosphate fertilizer, and aluminum fluoride.

The increased hunting and poaching that would occur during the project life would add to the hunting pressure on antelope and deer which could be one of the factors contributing to the low populations of these game animals in Utah. Further reductions in animal population would reduce the long-term productivity of deer and antelope herds in the area of concern. The short-term economic benefits of increased employment and tax revenues would be exchanged for the long-term effects on wildlife productivity.

CULTURAL RESOURCES

Additional study and evaluation of the historical and archaeological values on the project site would provide immediate input to scientific knowledge and would provide a data base for future studies. Construction would result in short-term accumulation, through the required examination of sites to be affected, of additional knowledge concerning past history.

Great technological strides have been made in recent times in the archaeological field. Future advances in techniques are expected to allow gathering of even more detailed data from ruins and sites. Examination, study, and excavation of these sites using current methods, would not produce as much information as preserving the sites for future study utilizing more advanced research strategies and techniques. Uncontrolled loss of values would also occur from increased use and vandalism of sites. Sites affected by such activities would not be available for use or they could be damaged to the extent that research potential would be diminished. The long-term losses of archaeological and historical values would be exchanged for the short-term economic benefits and production of mineral commodities resulting from the alunite project.

LAND USE

Recreation. The short-term increase in hunting pressure and the loss of habitat would affect the long-term quality of the game hunting experience.

These factors would reduce game populations and hunter success rates would decline.

The quality of the rockhounding experience would decline throughout the project life and beyond, as the number of easily found specimens of smoky quartz in the Mineral Mountains decreased.

There would be changes in the aesthetic values of the south end of Wah Wah Valley. These changes would be long term. The open space, natural appearance of the area would be permanently altered.

The long-term loss of recreation productivity would be necessary to realize the short-term economic benefits and production of mineral commodities that would result from the alunite project.

Agriculture. A long-term loss of livestock production would occur. Permanent removal of 573 acres of vegetation during the project life would result in the loss of 32 animal unit months of grazing forage. This loss would come from construction of permanent facilities. Loss of grazing forage would also occur on disturbed areas until vegetation was reestablished, which could require 15 to 20 years. Permanent loss of these AUMs would not be significant in terms of agricultural productivity (32 AUMs would feed approximately three cattle on an annual basis); they would be a trade off for production of alumina, potassium sulfate, phosphate fertilizers and aluminum fluoride.

Residential development for the increased population would require about 300 acres. It is unlikely that all this development would occur on agricultural cropland, but assuming that it would, then there would be a long-term loss of $72,000 in annual agricultural income. The trade off from this economic loss would be the economic benefit of increased employment and tax revenue that would result from the alunite project.

SOCIOECONOMICS

Development of the alunite project would provide an estimated 1,000 new jobs at the mine and processing plant. An average of 1,800 temporary construction jobs would be created during the 42-month construction phase. In addition, about 50 employees would be required for the operation of power plants associated with geothermal development. Although new jobs would be created, some of the skills needed would require employees from outside southern Utah. Qualified local people would benefit to some degree by having additional, higher-paying job opportunities and the average income of those who would be employed could be expected to raise substantially. Coupled with local expenditure by industry, the net result would be a possible major increase in regional income with a possible long-term economic cost benefit to the State of Utah.

Certain factors of the existing community structure would be overwhelmed at the onset of the project. These would include health, fire, and police protection (see Chapter 3).

Although harder to assess, changes in life styles would undoubtedly accompany development. Infusion of people with different values and life styles would mix existing values and life styles. Over an extended period this mixing would lead to the development of new values and life styles.

CHAPTER 7

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

CHAPTER 7

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

INTRODUCTION

This chapter discusses and evaluates the extent to which the proposed alunite development would irreversibly curtail availability of resources. Resources that would be irretrievably lost as a result of the proposal are also discussed and evaluated. For the purpose of this discussion, the following definitions are used:

Irreversible: Incapable of being reversed; once initiated, use would continue.

Irretrievable: Irrecoverable; not retrievable; once used, not replaceable.

The discussion in this chapter is presented for each appropriate environmental element. In addition, sections on loss of human life and loss of energy and materials that would be used in development and operation are included.

MATERIAL REQUIREMENTS

Table 7-1 summarizes the total quantities of materials that would be used in construction, operation, and maintenance of the alunite development over the project life. The use of these materials would be irreversible during the project life. With the exception of some metal that could be salvaged, the use of these materials would be an irretrievable commitment of resources.

Table 7-1. Summary of total material requirements - construction, operation, and maintenance of proposed alunite project

Material	Quantity (short tons)
Acetylene gas	35
Aluminum	300
Asbestos	8
Asphalt	450
Brass	5
Brick	280
Bronze	9
Concrete	30,000
Copper	400
Glass	250
Lead	28
Oxygen	38
Paper	15
Plaster	10
Porcelain	8
Rubber	800
Steel	50,000
Tile	250
Tin	150
Wood	1,000
Zinc	85

AIR QUALITY

During the life of the project, air quality and visibility would be reduced. This change is not irreversible; however, the loss of clean, clear air during the project life would be irretrievable in the area of concern.

WATER RESOURCES

The alunite mine and processing plant would consume approximately 7,622 acre-feet of water from the Wah Wah Valley ground water system each year. During the life of the project, this would be an irreversible commitment of 190,550 acre-feet of water that would otherwise be available for other purposes.

The increased population would require an additional 1,000 acre-feet of water each year. This would be an irreversible commitment of 25,000 acre-feet of water during the life of the project. This water would not be available for other uses. The water for the increased population would come from the Escalante Valley ground water system and would represent a 10 percent increase in the mining rate of water from this ground water system. The use of this mined water during the project life would be an irretrievable loss of 25,000 acre-feet of water from the Escalante Valley ground water system.

ENERGY RESOURCES

Mining, chemical processing, and power generation would require the irreversible and irretrievable use of 29 million tons of coal over the life of the project. According to National Petroleum Council estimates, there are 45.7 billion tons of recoverable coal reserves in the western United States. The coal that would be consumed by the alunite project represents 0.06 percent of the total reserves. Assuming an annual use of 1.1 million tons of coal with an average grade of 11,500 Btus per pound, the coal energy utilization would be 2.53×10^{13} Btus per year.

Processing the alunite ore would require 625 million gallons of fuel oil and operation of equipment would require 15.5 million gallons of diesel fuel. Because of a lack of data, gasoline requirements for vehicles have not been estimated. The use of these petroleum products would be irreversible and irretrievable. Assuming an annual use of 25.62 million gallons of fuel oils and diesel fuel with an average grade of 5.825×10^{6} Btus per 42-gallon barrel, the annual energy utilization of this energy source would be 3.55×10^{12} Btus. It should be noted that the reserves of petroleum fuels may be exhausted before the end of the proposed project life. However, according to the applicant, this situation may change as new technology for the alunite process is developed.

MINERALS

In addition to the commitment of coal and fuel oil discussed under the Energy Resources section of this chapter, there would be substantial quantities of minerals that would be irreversibly and irretrievably committed by the proposed alunite project. Table 7-2 summarizes the total commitment of these resources during the 25-year project life. None of these minerals would be available for other uses.

Table 7-2. Summary of total mineral requirements - construction and operation of proposed alunite project

Mineral	Quantity (25-year project life)
Alunite ore	100 million tons
Phosphate rock	38 million tons
Sand and gravel	600,000 cubic yards
Basalt	110,000 cubic yards
Potassium hydroxide	up to 2.5 million tons
Sodium hydroxide	up to 1.25 million tons
Sulfur	3.75 million tons
Ammonia	4 million tons
Lime	3 million tons

LOST PRODUCTION

Removal of 2,409 acres of vegetation during the project life would result in the irreversible loss of 193 animal unit months of grazing forage each year. The cumulative loss cannot be accurately quantified but it would continue beyond the project life until vegetation would be reestablished. Permanent loss of vegetation from 573 of the 2,409 acres would result in the irretrievable loss of 32 AUMs of grazing forage. This permanent vegetation loss would also result in the irretrievable loss of 415 acres of deer and wild horse habitat and 158 acres of antelope habitat.

CULTURAL RESOURCES

Implementation of the proposed action would involve an irretrievable commitment of archaeological values to exploration and investigation under current technical procedures. Once destroyed, these values would not be available for future study. Salvage sites could not be studied with more advanced technological methods that might be developed in the future. Twenty-seven known archaeological sites and a rockshelter would be altered or destroyed following required salvage operations. A rock house and dugout would be partially destroyed through excavation. Although surveys may identify sites that could be salvaged to prevent uncontrolled data loss, this would constitute an irretrievable commitment of the resources involved.

Increased populations would exert additional pressure on both historical and archaeological values in the area of concern, resulting in disturbance and destruction of sites. The total number of sites that could be impacted is unknown, but damage and destruction to sites would be an irretrievable loss of archaeological and historical values.

AESTHETICS

Implementation of the proposed action would irreversibly and irretrievably commit Wah Wah Valley to a more intensive, industrialized use than at present. Site preparation, construction activities, and operation of the alunite mine and processing plant would change the relatively undisturbed appearance of 2,409 acres of land in the south end of Wah Wah Valley. The present tranquility would be irreversibly changed by the noise and activity of the mining and processing operation during the life of the project. Paved parking areas, cement building foundations, the alunite mine, waste rock pile, and some roads would permanently occupy 573 acres, causing a permanent disruption to the natural setting. These alterations of the landscape in the south end of Wah Wah Valley would be considered irretrievable when viewed from Utah Highway 21.

LAND USE

The estimated increase of 4,500 people in the area of concern and the resulting increased recreational use would cause irreversible impacts on the recreation resource. Additional hunting and poaching would increase the pressure on big game populations; fishing pressure at Minersville Reservoir would increase significantly; and off-road vehicle use would increase, particularly around impacted residential communities. None of these changes would result in irretrievable changes to the recreation resource, but changes would be irreversible during the project life.

The increase in population would result in an increase in the collection of relatively scarce specimens of smoky quartz. Specimens collected would be irretrievably lost for future collection.

Increased traffic on Utah Highway 21 and the major access highway to the processing plant would result in irreversible increases in livestock losses from traffic accidents. The extent of this increase cannot be determined.

Population increases would require an estimated 300 acres of land for residential development. This land would be irreversibly committed to residential use during the project life and would not be available for other uses such as grazing or irrigated agriculture.

LOSS OF LIFE

There would be fatal accidents directly related to construction of facilities, mining of alunite ore, and operation of the processing plant complex. Projected future fatality rates based on historical information for on-the-job fatalities would have limited application to the alunite project. Since the alunite project is a pioneering effort, projected fatality rates would be speculative at best. However, construction, mining, and operation of chemical processing plants are all considered to be relatively hazardous occupations, and fatalities would occur.

In addition to fatal accidents directly related to the alunite project, there would be fatalities indirectly related to the project. Traffic accidents, murder, and suicide would all be indirectly caused by the alunite project.

Human resources lost as a direct or indirect result of the alunite project would be irreversible and irretrievable. While the number cannot be realistically predicted because of a lack of data, there would be more fatalities than have previously occurred in the area of concern.

SOCIOECONOMICS

The commitment to develop an industrial complex would encourage the development of specific social patterns. People in the area of concern would be committed to expanding social systems. The commitment to use resources for the proposed alunite development would result in an irreversible commitment to a new way of life and lifestyle for people in the impacted communities, particularly Milford. The project would result in an irreversible change for the Milford area from one of an agricultural/transportation-based economy to an industrial-based economy which would likely persist for years.

CHAPTER 8

ALTERNATIVES TO THE PROPOSED ACTION

CHAPTER 8

ALTERNATIVES TO THE PROPOSED ACTION

INTRODUCTION

The Secretary of the Interior has before him an application for Preference Right Leases (PRL) for potassium on 13,828 acres of national resource lands. The company has explored portions of these lands and indicates that valuable potassium reserves occur in five areas designated as A, B, C, D, and White Mountain. A mining plan has been submitted for approval on the approximately 350-acre area designated C.

Prior to issuance of a PRL, the Secretary must determine that a valuable discovery has been made and the land is chiefly valuable therefor. On those areas where these qualifications are demonstrated, the Secretary may (1) issue a lease, (2) lease with appropriate modifications and/or stipulations, (3) lease part and suspend action on other portions pending further specific action, (4) take no action (denial of application), or (5) recommend legislation to deny lease.

Further alternatives to the proposed action that are technologically feasible and reasonably available, including alternatives beyond the existing authority of the Federal Government, are also discussed in this chapter. Where appropriate, the discussion of each alternative includes a brief description of the environment, identification and analysis of impacts (if different from the proposed action), evaluation of mitigating measures, and identification of unavoidable adverse impacts. The unavoidable adverse impacts for each alternative are compared to unavoidable adverse impacts identified for the proposed action in Chapter 5.

ALTERNATIVE LEASING CONSIDERATIONS

Grant lease with standard stipulations. Mining and processing of alunite ore has not been attempted on a commercial basis in the United States. It is likely that environmental impacts would occur that would not be adequately mitigated by the standard leasing stipulations. The standard stipulations would probably adequately consider the environmental impacts associated with the proposed mining operations, but the potential impacts on air and water quality, vegetation, soils, and wildlife associated with the processing plant may not receive adequate consideration.

For example, the standard stipulation concerned with air quality requires the lessee to take such reasonable measures as may be needed to prevent operations from unnecessarily polluting air.

This ES has identified that the applicant must meet certain emission standards established by EPA. In this case, applicant would conform to air quality standards as illustrated in table 2-9. Thus, these requirements would probably result in substantial reductions when compared to the standard stipulations. Another example is identification of specific measures for protection of and sampling water quality to assure compliance with acceptable standards. The conventional stipulations would provide only that conventional standards be met and would fail to identify the source and cause of pollution in a timely manner.

If only the standard stipulations were required, a greater but unquantifiable level of pollution would result.

Lease with appropriate modification and/or stipulations. This environmental statement would be the primary tool for identification of potential impacts and for determination of stipulations required to mitigate these impacts.

The measures proposed by the applicant in Chapter 1 and mitigating measures discussed in Chapter 4 reflect the new operating and reclamation regulations (30 CFR 211, 43 CFR 3041) that would be required for the proposed action. These regulations apply specifically to coal but many of the provisions are appropriate for the proposed alunite mining operations.

Grant lease in part. There are also other conditions contained in 43 CFR 3520 which have to be considered even though the holder of a prospecting permit must be granted a lease if he is able to show he has discovered a valuable deposit and, in the case of potassium, that the land is chiefly valuable therefor. These regulations provide in part: (1) the lease area must be in a reasonably compact form, and (2) a valuable deposit must be shown on each prospecting permit area. If the lease applicant has failed to make a discovery of a valuable deposit on one or more of the prospecting permits, the Department must reject the application for those lands. The effects of this alternative are to reduce in part the scope of environmental impacts of the proposal. Thus, the alternative of reducing the area applied for is viable.

No action alternative (Denial of application). Denial of ten Federal Government actions (Chapter 1) required to authorize the proposed action would preclude development of the alunite project in Beaver County, Utah. The environment would be as described in the section entitled FUTURE ENVIRONMENT WITHOUT THE PROJECT in Chapter 2. The adverse impacts identified in Chapter 5 would not occur.

Domestic production of 500,000 tons per year of alumina, up to 370,000 tons per year of potassium sulfate fertilizer, up to 1.1 million tons per year of phosphate fertilizer, and up to 20,000 tons per year of aluminum fluoride would be foregone. The most significant impact of this loss of production would be the continued dependence of the United States on foreign sources of raw materials for use in the production of aluminum. Recycling of aluminum in the United States could reduce the dependence on foreign sources, but it is not realistic to expect additional recycling to supply the total domestic requirements for aluminum since 88 percent currently comes from foreign sources. The opportunity to develop the technology to produce alumina on a commercial scale from a new raw material would be delayed or lost. The national significance of the mineral commodities that would be produced by the proposed project is discussed in the Purpose and need section of Chapter 1.

Denial of the proposed action would preclude construction and operation of the alunite project and would result in the loss of significant long-term economic benefits to the State of Utah and Beaver and Iron counties. The increased tax revenues and additional employment opportunities that would result from the project would be foregone. The extent and significance of these benefits are described in the Socioeconomic sections of Chapter 3. Unless the permittee has failed to show that he has discovered a valuable deposit and the land is chiefly valuable therefor, the Department cannot deny the lease applications without creating a right of compensation for the lease applicant.

Legislation to deny. If it is established that mining the alunite ore would not be compatible with environmental requirements, legislation would be required to purchase any rights which may have accrued to the applicant. The effects of this alternative are the same as no action-denial.

ALTERNATIVE INITIAL MINING LOCATIONS WITHIN THE LEASE AREA

Alternative mining areas A, B, and D are mountain ridges or isolated mountains in the Wah Wah Mountain range close to the proposed alunite mine site (area C). The White Mountain alternative mining area is a ridge on the west side of White Mountain, across the valley (east) from the proposed plant site. (See figure 1-2 in Chapter 1 for all locations.)

Regional description of the environment in Chapter 2 encompasses all the alunite deposits in areas A, B, D, and White Mountain.

Potential environmental impacts which would result from mining ore in the four alternative mining areas would be similar to those discussed for area C. Distances from area B and White Mountain are approximately the same as for area C. The longer distances from the processing plant to areas A and D (2 to 3 miles) would create the need for additional road mileage or a longer conveyor line to transport the ore. This would require vegetative removal and soil disturbance on an additional 20 acres. This disturbance would create additional impacts on aesthetics, soil loss, and forage as well as additional habitat losses to domestic and wild animals. The additional road mileage or conveyor construction and use would result in increased air emissions from construction vehicles and dust. Air quality would be slightly lowered by increased particulate levels during construction and operation. Additional energy would also be required to operate the conveyor or vehicles over the longer routes.

The mitigating measures included in the proposed action and in the mitigating measures chapter would mitigate these additional impacts to the same degree as for the proposed action. However, the net result would be additional impacts to vegetation, soil, animals, and aesthetics. Specific mining plans for these alternative mining locations are not available and increases in impacts cannot be quantified.

ALTERNATIVE PROCESSING PLANT DESIGN

The applicant has raised the possibility of processing phosphate rock at the alunite plant site rather than at the phosphate mine site in Idaho. This alternative would accomplish the objectives of the proposed action and is included in this statement at the suggestion of the applicant. The alternative of not producing phosphate fertilizer at the proposed alunite plant is also included in this section. The information available on these alternatives is preliminary and additional environmental review would be required prior to implementation of an alternative processing plant design.

Alternative of beneficiation and calcination of phosphate rock at alunite processing complex. Alumet could ship 2.5 million tons a year of crude phosphate rock from its mine in Idaho to the Wah Wah Valley plant site for upgrading and use in fertilizer manufacture. The phosphate rock would be shipped by rail during the warm months of the year and stockpiled at the Wah Wah Valley plant site to avoid freezing of the wet ore in transit during cold weather. About 7,400 tons per day of rock containing 26.5 percent phosphate (P_2O_5 equivalent) would be reclaimed from the stockpile and beneficiated by desliming and calcining to make 5,000 tons per day of concentrate containing 31 percent phosphate, (flowsheet, figure 8-1). Individual operations numbered to correspond with the flowsheet steps are summarized below.

Step 1 - Crush and grind. Phosphate rock from the stockpile would be dry crushed to about one-half inch or dry crushed and wet ground in rod mills to about 6 mesh. Based on limited data available from similar operations, dust emission during reclamation from stockpile and dry crushing would be approximately 1,000 pounds per day.

Step 2 - Deslime and filter. Ore slurry would be screened at about 6 mesh, then deslimed in successive passes through three washing cyclones. Slime slurry at about 19 percent solids and containing 2,100 tons of

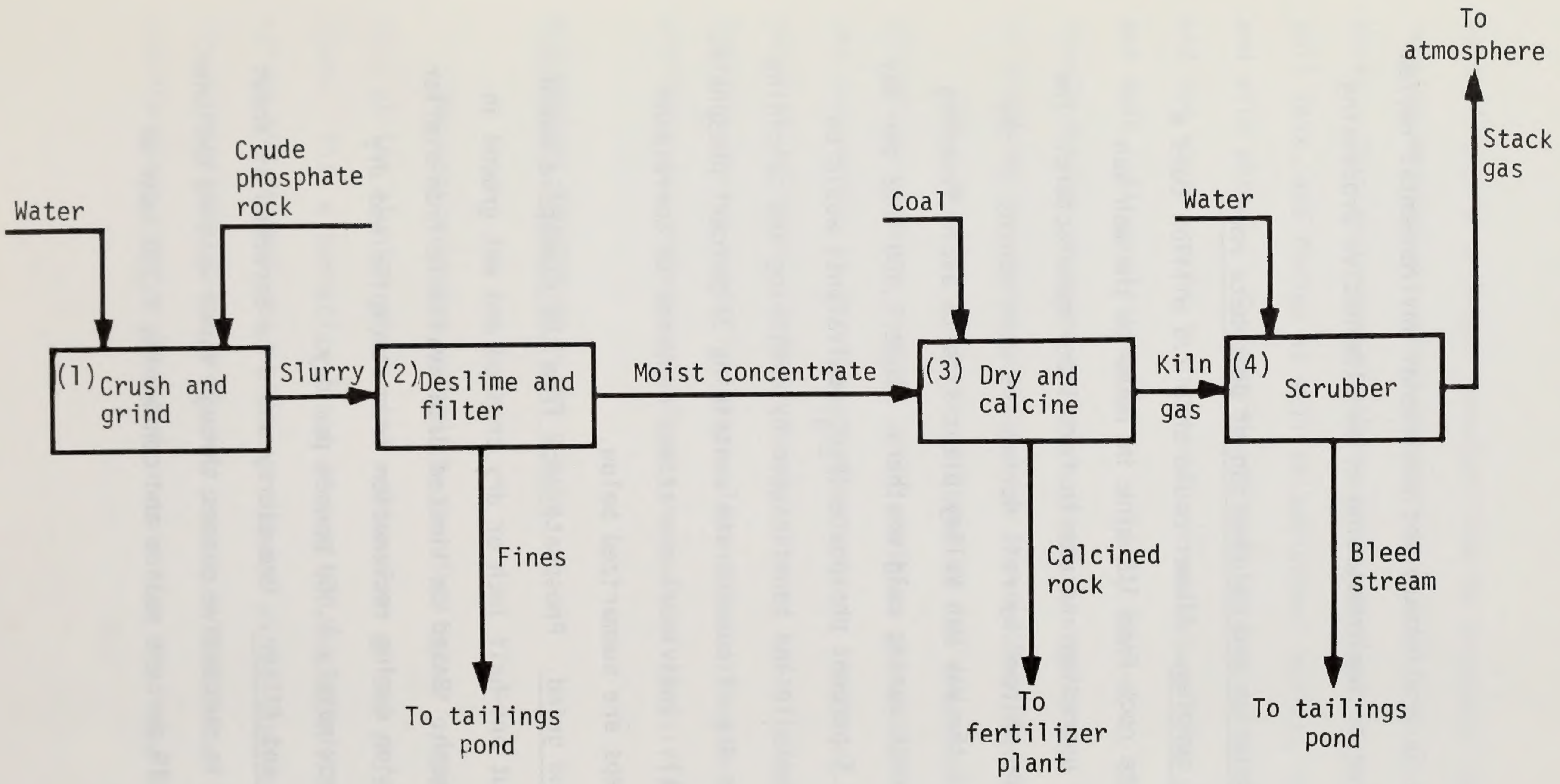

Figure 8-1
GENERALIZED FLOWSHEET – PROCESSING OF PHOSPHATE ROCK AT ALUNITE PLANT COMPLEX

slimes per day would be discarded to a slime tailings pond. Of the 1,450 gallons of water per minute required to wash and transport the slimes, 770 gallons per minute would be reclaimed from the tailings pond. Estimated partial chemical analysis of these limes shows 19.7 percent phosphate, 29.4 percent calcium oxide, 1.5 percent ferric oxide, 4.3 percent aluminum oxide, 0.8 percent magnesium oxide, 25.9 percent silica dioxide, 3 percent fluorine, and 7.6 percent loss on ignition. The coarse underflow from the cyclones would be filtered and the filtrate returned to the slime washing circuit.

Step 3 - Dry and calcine. Deslimed and filtered rock at about 16 percent moisture content would be dried in a rotary drier using hot combustion gas from subsequent calcination. Dry concentrate would enter a surge bin leading to a calciner where the material would be heated to 1,450° F by combustion of carbon in the concentrate and supplemental firing using about 120 tons of coal per day. Calcined rock would be cooled before storing in closed bins. The calcining operation would remove unwanted carbon and improve the processing characteristics of the phosphate concentrate in the fertilizer plant. Offgas from drying and calcining would be scrubbed to remove particulates, sulfur dioxide, and any gaseous fluoride that might form. Alumet estimates that scrubbed gas emitted to the atmosphere would contain 70 pounds particulates, 30 pounds sulfur dioxide, 270 pounds nitrogen oxides, and 1 pound fluoride per day. Dust emissions from dry and calcined rock storage bins would be controlled by baghouse collectors. Particulate emissions to the atmosphere would be 60 pounds per day.

All of the air emissions and tailings described above would be in addition to the emissions and waste products identified for the proposed action. Table 8-1 summarizes these additional emissions and waste products. These additional emissions would probably not result in pollution concentrations or emission rates in excess of federal ambient air quality standards (Class III). Mitigating measures to control emissions would be incorporated into the design of the alternative.

An additional 68 employees would be required to operate the phosphate rock processing plant, an increase of approximately 7 percent over the proposed action.

Approximately 1,000 acre-feet of additional water and 40,000 tons of additional coal each year would be required to operate the phosphate rock processing plant.

Table 8-1. Additional emissions and tailings - phosphate rock processing plant

Emission/tailings	Quantities
Fugitive dust	1,000 lb/day
Particulates	130 lb/day
Sulfur dioxide	30 lb/day
Nitrogen oxides	270 lb/day
Gaseous fluorides	1 lb/day
Slime slurry	2,100 ton/day

Alternative of not producing phosphate fertilizers. The applicant could sell the sulfuric acid produced in the alunite plant on the open market and not process phosphate rock into fertilizer products. If this occurred, there would be a daily reduction in air emissions from the processing plant complex of 2,103 pounds of particulates, 400 pounds of ammonia, and 940 pounds of gaseous fluorides. There would also be a reduction of 5,030 tons per day of tailing solids and 18,045 tons per day of tailings solution. These figures represent the emissions identified for the fertilizer and aluminum fluoride plants (table 1-6). Emissions from the power generation plant would also be lower because of the reduced power requirement. Total water requirement would be reduced at least 1,580 acre-feet. The 575 acres proposed for use as a gypsum tailings pond and the associated 30-acre water reclaim pond would not be required for this alternative. Disturbed acreage would be reduced from 2,409 acres to 2,110 acres. The number of operation employees would be reduced by at least 121 workers to a total of about 880 employees.

The residual impacts under this alternative would be significantly lower than for the proposed action. Particulate levels would be reduced about 17 percent, ammonia and fluoride emissions would be eliminated, water requirements would decrease about 22 percent and the disturbed area would be reduced approximately 21 percent. These figures do not incorporate reduced emissions from the power generation plant. In addition, there would be a 12 percent reduction in the number of operation employees which would result in lower socioeconomic impacts.

ALTERNATIVE ORE TRANSPORT

A trucking system for ore transportation would consist of loading at the mine site and hauling ore to the processing plant, a distance of 5 miles. This system would require at least seventeen 100-ton capacity trucks to supply the daily production requirements of the processing plant. Extra trucks would have to be available in case of breakdown, accidents, or bad weather. A paved hauling road would have to be constructed which would probably follow the same route proposed for the mine access road in Chapter 1.

Trucking ore rather than using an enclosed conveyor system would result in increased atmospheric emissions and an increase in road accident rates. By comparing fuel requirements for a similar operation and utilizing emission data from diesel fuel trucks calculated for the U.S. Department of the Interior "Proposed Development of Oil Shale Resources." 1975 draft Environmental Impact Statement, table 8-2 shows estimated increased emissions from diesel trucks. The impact of these increased emissions is not known because of a lack of data. In comparison with the proposed method of ore transport, this alternative would result in approximately a 1 percent increase in particulate emissions, less than 1 percent increase in sulfur oxide emissions, and about 8 percent increase in nitrogen oxide emissions. Carbon monoxide and hydrocarbon emissions would be increased significantly since there are no major sources of these pollutants in the proposed action.

Table 8-2. Estimated cumulative emissions, diesel trucks

Tons hauled per day	16,400
Ore hauled	
Trucks per year[a]	51,850
Million tons per year	5.0
Diesel fuel used-tons per year	466,650[b]
Estimated emissions - tons per year[c]	
Particulates	26
Sulfur oxides	52
Nitrogen	539
Carbon monoxide	647
Hydrocarbons	108

[a] Loaded trucks; same number of empty trucks would be required.

[b] Includes empty trucks.

[c] Assumed to operate 305 days per year; includes empty trucks. Emissions calculated from basic data included in the U.S. Department of Interior Draft Environmental Impact Statement "Proposed Development of Oil Shale Resources", 1975.

The ore truck transportation alternative would result in an increase of 20 project employees (one truck driver per truck, one mechanic per ten trucks, dispatchers). This would increase the social impacts and associated environmental impacts resulting from the population increase by approximately 2 percent.

Safety measures could be implemented to reduce the number of accidents to a very low level, but the other impacts could not be effectively mitigated and would be additive to the residual impacts listed in Chapter 5.

ALTERNATIVE POWER SOURCE

Geothermal power production. Although geothermal energy may be developed near Milford, Utah, the proposed timing of the alunite project would require the availability of power by the proposed startup date of 1980. Therefore, the alternative use of geothermal power is not considered to be a viable alternative. Geothermal production, if developed, could not be available until 1981.

New transmission line (138 kilovolt). Utah Power and Light has determined that power for the alunite project could be provided by a 74-mile long 138 kilovolt (kV) line, connected to the Sigurd-Cedar City 230 kV line (now under construction) at Little Dog Valley (figure 8-2). The minimum right-of-way width for a line of this size would be 100 feet. The new line would extend in a northwesterly direction to the Cameron substation east of Beaver, Utah. From this point, the line would extend along the same route as the 44 kV line presently serving Milford, Utah. From Milford to the proposed project site, the route would follow a southwesterly alignment to the processing plant complex.

Construction of a new transmission line to satisfy power requirements for the alunite project, negating the need for a 75-megawatt electric generating plant, would result in significantly different impacts than the proposed action. The major impact changes would result from transmission line construction and from a reduction in the quantity of coal utilized in the total operation.

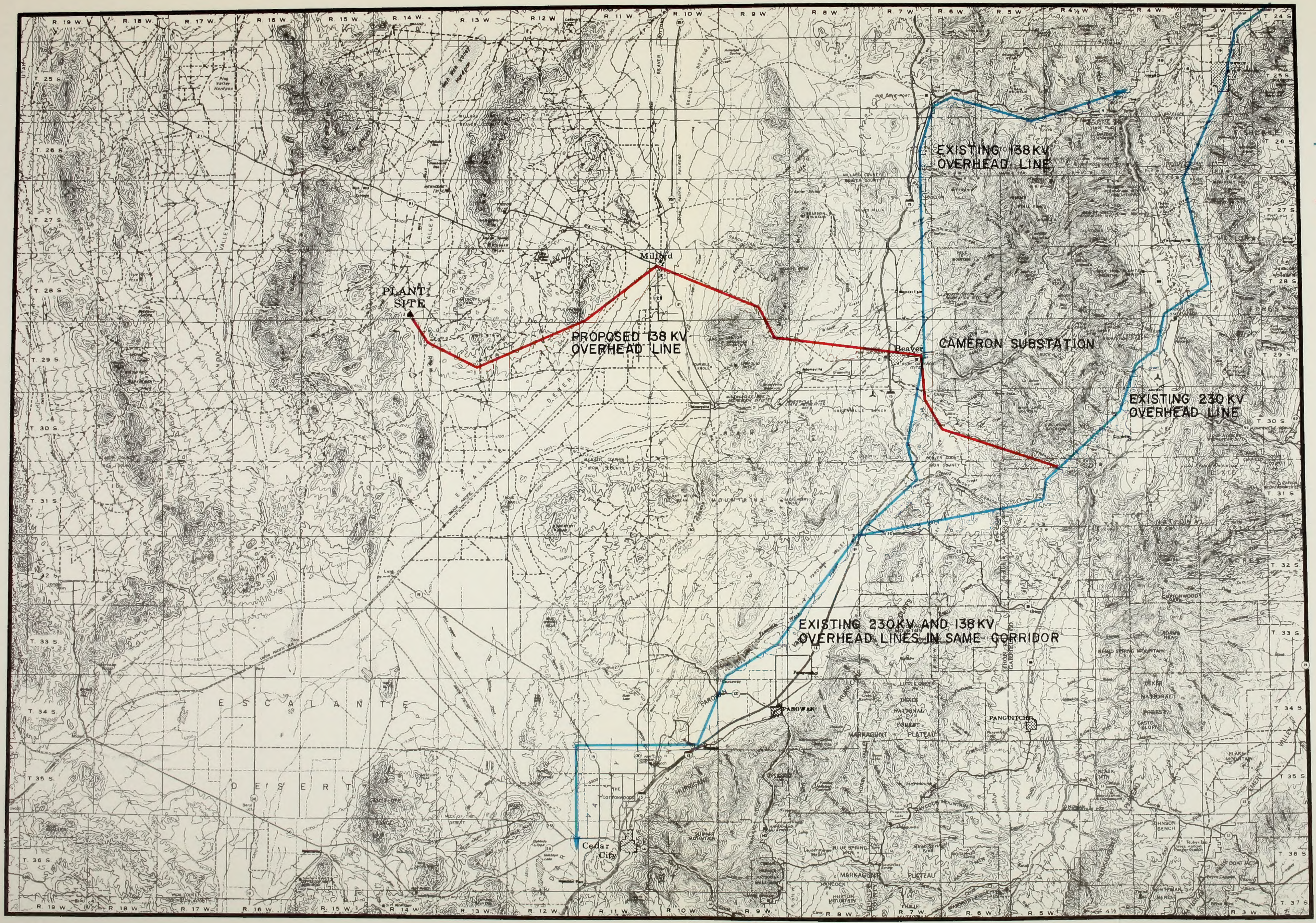

FIGURE 8-2

ALTERNATE POWER SOURCE FOR ALUNITE PROJECT

If this alternative was adopted, the three 25-megawatt steam boiler/electric generator units and cooling tower of the basic proposal would not be required. Since waste heat from that electricity generating plant would not be available, a single coal-fired boiler, to generate steam at about 125 pounds per square inch pressure, would be needed to provide total heat requirements in the processing operation. This single boiler plant would result in total coal consumption of about 100 tons per day or 700 tons per day less than the proposed action.

Coal combustion would result in 130 tons of ash, 30 tons of sulfur dioxide (SO_2) and 10 tons of nitrogen oxide (NO_x) daily. Electrostatic precipitators would remove 102 tons of fly ash per day from the combustion gas. Additional ash, 90 percent of the SO_2, and 20 percent of the NO_x would be removed by wet lime scrubbers using 27 tons of lime per day. The fly ash plus 26 tons per day of bottom ash would be slurried in waste water and pumped to the silica tailings pond. The scrubber bleed slurry, containing 55 tons per day of unreacted lime, calcium sulfite, and calcium sulfate, would be pumped to the silica tailings pond. Forty-five gallons per minute of blowdown water would be used in slurrying the ash for disposal.

Description of the environment. The regional environmental description of the proposed action encompasses a part of the environment of this alternative. Much of the area outside the proposed area of concern is similar, e.g., climate, so this description concentrates on parts of the environment not covered in Chapter 2.

Climate and air quality. Conditions are basically the same as described in Chapter 2. The area south and east of Beaver, Utah, in the higher elevations, receives 14 to 16 inches of precipitation yearly.

Geology and topography. Geology of the area would not be impacted by a power transmission line so geology is not described. A geologic description concerning the area is contained in planning documents in the Cedar City District Office, BLM, Cedar City, Utah (Unit Resource Analysis for the Beaver and Buckskin Planning Units).

The transmission line would cover portions of Wah Wah Valley and Escalante Valley already described in Chapter 2. From Milford to the Cameron substation east of Beaver the line would cross the Mineral Mountains (elevation 8,000 to 9,000 feet) and Beaver Valley, a narrow, flat valley to the base of the Tushar Mountains. From this point, the line would run south and east to Dog Valley crossing the high hills between the Tushar Mountains and the Markagunt Plateau. Elevation along this portion varies from 6,000 to 8,000 feet.

Hydrology. Three live streams would be crossed: Beaver River, Indian Creek, and South Creek. These streams are used for crop irrigation in Beaver Valley. No sediment records are available for these three streams, all of which carry sediment loads during high runoff and flood periods. Many small drainages would be crossed. These drainages carry runoff from spring snow melt and high intensity summer storms.

Soils and vegetation. A description of soils along the transmission line corridor is contained in the Beaver River Basin Survey

(National Resources Inventory, Beaver River Basin, Appendix I, 1972). This study showed that erosion potential varied from moderate to not apparent on the soils that would be traversed.

In addition to plant communities already described in Chapter 2, cropland (alfalfa hay and native meadow grain), and a mountain-shrub community, containing oak brush, big sagebrush, service berry, bitter brush, snow berry and big rabbitbrush occur along portions of the alternative transmission line. Major understory species are bluebunch wheat grass, western wheat grass, squirrel tail, Idaho fescue and native forbs.

Wildlife. Additional species not described in Chapter 2:

Pheasant. A small population in the cropland in Beaver Valley.

Fish. All live streams contain dace, shiners, and suckers. The streams are stocked by the Utah Division of Wildlife Resources and support a sport fishery. Table 8-3 shows species and stocking rates.

Antelope and deer. Antelope would only be involved with the portion of the transmission line west of Milford, Utah. The area south and east of Beaver, Utah is high quality winter, spring, and fall mule deer habitat.

Cultural resources. There are no currently designated national historic sites within the alternative transmission line, and none have been considered for nomination to the National Register of Historical Places. The Utah State Historic Preservation officer would be consulted

Table 8-3. Sport fish species and fish stocking of streams

Streams	Number stocked per year	Species	Type
Beaver River	12,000	Rainbow Trout	Catchable
Indian Creek	2,500	Rainbow Trout	Catchable
South Creek	750	Rainbow Trout	Catchable
All streams	Unknown	Cutthroat Trout	Catchable

if sites with National Register potential were located, but the BLM planning system has not identified any historic sites within the alternative transmission line.

An archaeological field survey has not been made on this transmission line and the full archaeological potential is not known.

Aesthetics. The aesthetic description is basically the same as in Chapter 2, except where the transmission line would pass through Milford and Beaver (small nonindustrialized communities), cropland and the three perennial streams. These are not unique areas in southern Utah and have moderate scenic quality.

Land use. The land use component of Chapter 2 considers the majority of the area that would be affected by this alternative. Additional material is added below.

Recreation

Fishing. Beaver River, Indian Creek and South Creek provide stream trout fishing.

Hunting. Additional mule deer hunting areas that would be affected by this alternative are the Mineral Mountains and the hills south and east of Beaver, Utah. The latter area receives the greatest hunting pressure.

Grazing. A total of ten grazing allotments would be traversed by the transmission line.

Socioeconomic condition. Chapter 2 covers both Beaver and Iron counties, which encompass this alternative.

Environmental impacts

Air quality. Table 8-4 summarizes the daily emissions from the proposed action (processing plant and electric generating plant) in comparison with daily emissions resulting from the alternative of a power transmission line. Emission rates are based upon anticipated installation and utilization of the best available pollution control equipment.

Pollution levels under this alternative would be considerably lower than from the proposed action. With the alternative power source, particulate emissions would be 40 percent less and nitrogen oxide emissions would be about 90 percent less. Reduction of visibility in Wah Wah Valley would be significantly lower for the alternative power source. State and federal air quality standards would be met by both the proposed action and this alternative.

Table 8-4. Comparison of emissions from the proposed action and the alternative of a transmission line (eliminating 75-megawatt power generating plant)

Emission	Proposed action	Alternative power source
Particulates	3,500 lb/day	2,100 lb/day
Sulfur dioxide	9,500 lb/day	5,600 lb/day
Nitrogen oxide	21,000 lb/day	1,600 lb/day
Ash	220 ton/day	128 ton/day
Unreacted lime	700 ton/day	55 ton/day

Minor amounts of dust would result from line clearing, construction operations, and vehicle travel on newly developed roads or existing unsurfaced access roads. The disturbance would be of short duration and would not contribute significantly to reduction of regional air quality. The adverse impact would be minimal since it would be visible only for a limited distance and the proposed line would pass through relatively uninhabited areas.

Topography. Construction of access roads, tower pads, storage and staging areas, and other similar areas would require minor alteration of the topography along the right-of-way. Roads and pads would require construction cuts and fill to provide level areas for vehicle travel, assemblage of material, and erection of structures. Topographic changes from road and pad construction would be accentuated on steeper topography. Impacts from these changes would affect aesthetic quality and are discussed in that environmental component.

Hydrology. Minor stream pollution would result from construction activities wherever the transmission line would cross live streams. The impact would be limited to approximately a 1-day duration at each stream crossing. The small increases in sediment loads would not result in downstream damage to irrigated cropland. Three live streams would be crossed. Equipment service sites adjacent to streams or on watersheds and accidental spills could add oil and gas contaminants to streams. Human wastes from construction workers could temporarily pollute the perennial streams. The impact at dry crossings in drainages is not considered a significant factor.

Soil and vegetation. Soil and vegetative disturbance would result from construction activities for access roads, preparation of structure sites, line construction, and clearing operations. The estimated acreage of soil and vegetative disturbance is shown in table 8-5.

Clearing of native species would result in invasion of annual and perennial weed species. Reestablishment of native vegetative cover would take from 15 to 20 years.

The development of new roads and trails would encourage off-road vehicle use creating soil and vegetation disturbance after project completion. Impacts from these disturbances would primarily affect the aesthetic value of the area involved. Impacts cannot be quantified, but are expected to be insignificant.

Wildlife. The primary effect of the transmission line construction would be the removal or disturbance of vegetative cover. Road construction and other surface disturbing activities would reduce habitat

Table 8-5. Acreage of vegetation and soils occupied by the alternative transmission line right-of-way

Vegetation community	Total acres	Acres adjacent to existing 44 kV line	Acres of new alignment
Mixed shrub-grass	148	66	82
Pinyon-juniper	72	22	50
Revegetated	2	--	2
Mountain shrub	46	14	32
Cropland	20	20	--
Urban	4	4	--
	292	126	166

at the rate of about 4 acres per line mile. On big game ranges, browse and forbs would be lost. The vegetation removed would not significantly affect the deer and antelope populations since the disturbed area would be less than 0.1 percent of the habitat that is available for these species. Table 8-6 shows acreage of major species' habitat that would be affected by transmission line construction.

The disturbed acreage would be spread over a 74-mile length and would not cause a reduction in major wildlife species. Transmission towers located near roads could promote indiscriminate shooting of perching birds. Conversely, the poles could serve as perches in a treeless terrain, thus enhancing raptor habitat.

Table 8-6. Acreage of major wildlife species habitat occupied by the 44 kV transmission line

Species	Total acres	Acres adjacent to existing kV line	Acres of new alignment
Antelope	82	--	82
Mule deer	118	36	82
Mountain lion	20	--	20
Pheasant	20	20	--

Sediment and accidental spills of petroleum products from construction activities could cause downstream pollution at stream crossings and approaches. This could cause temporary or permanent damage to fish habitat resulting in a reduction in fish population. Estimated impact area would be one-quarter of a mile downstream from a crossing or pollution source.

Cultural resources. No historical sites have been identified in or adjacent to the transmission line. Archaeological site potential is greatest at elevations below 7,000 feet, near available water and flat tillable land, or in caves.

Archaeological sites could be disturbed or destroyed by construction activity. The impact of this effect could result in the loss of scientific knowledge. The presence of transmission lines close to archaeological sites would reduce their value for interpretation. Additional access would increase potential for vandalism of any sites found in the general areas of the corridor.

Aesthetics. There are four types of aesthetic settings found along the proposed transmission line - urban, rural, range, and forest.

A transmission line fits into the urban setting. Normally there are other similar developments such as power and telephone lines, roads, railroads, and excavations located in the urban setting. Scenery and visual quality are normally not as important here.

Developed agricultural land is the focus of the rural setting. Existing developments include scattered dwelling areas, roads, croplands, fences, reservoirs, canals, and utility lines. Transmission lines are generally compatible with this type of setting and visual conflicts would not be readily apparent.

Of the total length of 74 miles, 67 miles of the alternative line would be located in the range or forest scenic category. Occasional roads, trails, power and telephone lines, and livestock fences are found in this setting. The line would follow an existing 44 kV line for 25 miles and the remaining 42 miles of the transmission line would traverse land in the range and forest categories, where roads, structure sites, and other areas of surface disturbance would alter existing topography, disturb soils and vegetation and conflict with most natural settings. In general, transmission lines would not harmonize with the range or forest setting and visual impacts would be more readily apparent.

The construction of the power line and the associated human activities could be expected to result in an increased litter and solid waste disposal problem. This impact would be primarily localized in and around the actual right-of-way and access roads.

Land along the alternative transmission line is rated and placed in the moderate scenic quality category. Transmission lines normally do not harmonize with moderate quality scenery. Visual aesthetics would be affected most in the area south and east of Beaver which is higher in elevation and has less evidence of human activities than other portions of the transmission corridor. Transmission line structures may detract from the relatively scenic area because they could be seen from a greater distance.

Visual impacts created by the presence of transmission structures, transmission lines, and crossroads cannot be completely avoided. No highly scenic or unique areas would be destroyed by this alternative.

Land Use

Recreation. Temporary or permanent damage to the sport fish habitat from construction activities could reduce the fish population (unpredictable) causing impacts to the recreational experience of fishing the affected streams.

New roads and trails along the 42-miles of new transmission line construction would be available for big game hunters. This new access could cause more legal and illegal killing of big game.

Grazing. There would be a temporary loss of approximately 30 AUMs of livestock forage over the 74-mile transmission line. This would occur within ten grazing allotments and would not cause any reduction in numbers of livestock grazing these allotments.

It is anticipated that the power line construction would encounter developments and structures such as fences and watering facilities placed on the land to facilitate livestock grazing. During construction, minimal alteration or removal of such developments would be required and some damage could occur.

Socioeconomic conditions. Adverse socioeconomic impacts would be essentially the same for this alternative power source as for the proposed action. Construction of the transmission line would require a relatively small number of men for a short period of time. The number of employees needed to operate the processing plant complex would be only slightly reduced by elimination of the 75-megawatt power plant.

The availability of additional electrical energy would enable the city of Milford to serve the needs of the increased population and could also provide a base for the growth of other industries not directly related to alunite. This diversification of the economic base would reduce the dependence of Milford on the alunite project, should it be developed.

Mitigating measures

Measures required by federal agencies

1. Travel would be permitted only on existing roads or approved construction roads. No off-road travel would be allowed outside the right-of-way.

2. Existing roads would be used wherever feasible. Locations of new roads would be specifically approved by the appropriate authorized officer. New roads would be constructed with the minimum possible clearing and would be no wider than necessary for use by the specific equipment needed.

3. In areas of moderate sideslope, road restoration would be accomplished in such a manner that working equipment would not disturb the area adjacent to the road. On steep slopes, the fill material would be replaced and the cut bank sculptured to approximately the original slope. All restored areas would be water barred and reseeded. Water bars would be added at a 45-degree angle at 100-foot intervals on roads with slopes in excess of 10 percent gradient.

4. All used oil or other petroleum products would be hauled away. There would be no release of crankcase oil, etc., on the ground or into streams.

5. Wherever possible construction of the transmission line in the following situations would be avoided: ridgetops, highpoints in a particular area, areas where the line would be skylined, long views of lines coming down hillsides adjacent to highway, and crossing highways at high points in the road where towers can be seen from a great distance.

6. General cleanup would be done continually throughout the duration of the project to prevent littering.

7. Leveling at the structure site would be limited to the crane pad.

8. All noncombustible waste such as conductor, ceramic, or metal scraps would be collected and hauled to an authorized dump.

9. To the fullest extent possible, brush, timber, and other wood products would be disposed of by chipping or shredding. After reduction in this manner the materials would be dispersed to serve as mulch rather than burned.

10. Brush blades would be used instead of dirt blades in clearing operations where such use would preserve the natural grass and low brush cover.

11. In areas where the authorized officer deems it necessary, reseeding would be required. Reseeding would be of native plant species determined by the authorized officer of BLM to have a high success probability. If revegetation fails to establish in 3 years, the applicant would be required to reseed the previously treated area.

12. There would be no pushing of soil into stream beds.

13. Roads would cross drainage channels at right angles at the level of the stream gradient.

14. Drainage channels would not be blocked or changed.

15. Portable chemical toilets would be utilized during all phases of construction.

16. Storage yards and construction camps would not be located within 500 feet of waterways.

17. Prior to construction, the company responsible for construction would complete a survey and inventory of historical and archaeological sites within the area to be occupied by the right-of-way and the access roads. This survey would be performed by a BLM-approved archaeologist. Results of this survey would be provided to the authorized officer who would require the company to relocate the proposed transmission line facilities in order to avoid destruction of any such located sites, or to delay construction until salvage operations could be completed.

Evaluation of mitigating measures

Topography. Impacts would be partially mitigated by leveling and reshaping, but minor changes to topography would become permanent.

Hydrology. All adverse impacts on water resources would be mitigated with the possible exception of minor sediment problems caused by equipment fording streams and accidental spills of petroleum products near or into streams.

Measures that would be fully successful are protection of live streams by locating construction camps away from waterways and the requirement of hauling petroleum waste products away rather than releasing them on the ground or in waterways. Use of portable chemical toilets would prevent pollution of streams by human wastes.

Soils and vegetation. Reseeding of disturbed areas at higher elevations would result in reestablishment of vegetation and stabilization of disturbed soils. Reseeding efforts at lower elevations may or may not be successful, depending on climatic conditions after treatment. Control of ORV use, access road construction, and construction methods would facilitate construction of the transmission line with a minimum of disturbance to soils and vegetation.

Wildlife. Mitigating measures would effectively eliminate the possibility of stream pollution which would result in damage to fish populations. Reseeding of disturbed areas at higher elevations would result in restoration of wildlife habitat.

Cultural resources. Mitigating measures would be only partially successful in reducing impacts on cultural resources. Salvage of archaeological sites would prevent the loss of artifacts but scientific value would be lost by removing these items from the site.

Aesthetics. Mitigating measures would be partially successful, reducing scars on soil and vegetation and reducing skyline effects through location of structures. Required cleanup of construction sites would eliminate the visual impact of garbage and debris.

Unavoidable adverse impacts

Air quality. No significant impact.

Geology and topography. Slight topographic changes would be made. The impacts from the topographic changes are discussed under Aesthetics.

Hydrology. Minor stream pollution would occur for approximately 1 day on each live stream during construction activities. This would not cause damage to irrigated cropland. Accidental oil spills during construction activities could pollute the streams.

Soil and vegetation. A total of 292 acres would be affected by vegetation removal during this operation. Some areas of high potential (140 acres) could be reseeded. The remaining 152 acres would require 15 to 20 years to reestablish the natural vegetation cover. During periods of drought the reseeding efforts could fail and all 292 acres would have to be rehabilitated by the natural process over a period of 15 to 20 years.

Additional soil and vegetation disturbances could result from increased off-road vehicle use on new roads and trails in the area; additional acreage affected cannot be quantified.

Wildlife. Wildlife habitat would be lost; however, these losses would be spread over a 74-mile length causing only minor impacts to any one area. No reduction in number of major wildlife species would be expected.

Transmission lines located near roads would promote indiscriminate shooting of perching birds.

Sediment and accidental spills of petroleum products from construction activities could cause damage (temporary or permanent) to fish habitat. This could cause a reduction in fish population. Estimated impact area is one-quarter of a mile downstream from a crossing or pollution source.

Cultural resources. Specific unavoidable adverse impacts cannot be defined without the necessary field investigations in the impact areas of the proposed action.

Once an archaeological site has been excavated and salvaged, scientific and historic values would be lost with the removal of the artifacts. Also the location of power line facilities near an archaeological site would reduce the quality of the experience of visiting such a site.

Aesthetics. Topographic changes, though minor, would be permanent. Scars from soil and vegetation disturbance would be visible for 15 to 20 years. The 74-mile transmission line would be a visual intrusion for the life of the project. Although there is no high quality scenery involved, there would be a deterioration of visual qualities along the entire transmission line.

Land use

Recreation. Sport fish populations could be reduced causing impacts to the recreational experience of fishing the affected streams. This is impossible to predict or quantify.

Opening of new roads and trails could cause additional legal and illegal killing of big game.

Grazing. There would be a loss of approximately 30 AUMs of livestock forage. This would occur within ten grazing allotments and would not cause any significant reduction in numbers of livestock grazing these allotments.

During construction activities, livestock developments could be damaged.

Socioeconomic conditions. Impacts would be essentially the same as under the proposed action. Additional electrical energy for the city of Milford could stimulate growth of other industries not related to alunite, thus diversifying the economic base and reducing the dependence of Milford on the alunite project.

ALTERNATIVE PROCESSING PLANT SITES

Introduction. Since the proposed action is a pioneering effort and very little data are available to provide background information on location requirements, the applicant was requested to evaluate and submit information on alternative plant sites. The only conditions imposed were that the plant sites be technically feasible and reasonably available.

At least six sites were investigated by Alumet and three alternative plant sites were found to meet these conditions. According to Alumet, the processing plant must be located relatively close to the alunite mine in order to be feasible. These three alternative plant sites will be evaluated in this section. All of these alternative sites are within the area described in Chapter 2 (Description of the Environment) and no additional description of the environment is included in this discussion. The proposed action is described for each alternative plant site followed by an analysis of unmitigated impacts. The impact analysis concentrates on differences between the alternative and the proposed action. This impact analysis is followed by a discussion of mitigating measures and unavoidable impacts. A summary of the impacts associated with all of the alternative plant sites and the proposed plant site is presented at the end of this section.

Alternative plant site 1. Figure 8-3 shows the location of the major components of the proposed alunite development for alternative processing plant site 1.

Unmitigated impacts. The tailings ponds and structures of the processing plant complex for alternative plant site 1 would not be visible from Highway 21 and the visual impacts discussed in Chapter 3 would be avoided. The tailings ponds would be protected from wind by the surrounding mountains and less fugitive dust would occur during periods of high wind. As a result, the visual impact would be significantly less than for the proposed action. The alternative tailings ponds would be located in the Willow Creek drainage or its tributaries and would be vulnerable to flooding and washouts from flash floods and heavy spring runoff. Washout of the tailings ponds could result in loss of vegetation and contamination of surface water used by livestock and wildlife.

Alternative plant site 1 would disturb vegetation on 2,599 acres. This is 190 more acres (7 percent increase) than the proposed site. This site would occupy 374 acres of the revegetated plant community compared to 15 acres for the proposed action. The revegetated community is habitat for deer and wild horses and 374 acres is approximately 5 percent of the revegetated acreage in the area of concern. The loss of this portion of the revegetated area would result in the additional loss of 75 animal unit months (AUMs) of spring/fall livestock forage in the Bucket Ranch Allotment. This loss would represent about 4 percent of total grazing use (1,700 AUMs) in the allotment.

Selection of this alternative plant site would result in the disturbance of 1,224 additional acres of deer habitat, 754 fewer acres of antelope habitat, and 359 additional acres of wild horse habitat than the proposed site. All of these differences are significant changes from the proposed action but, as discussed in Chapter 3, these habitat losses represent less than 1 percent of the available habitat for these species and would not be expected to result in significant impacts to animal populations.

Mitigating measures. Tailings ponds and dikes could be designed to eliminate the possibility of flooding and washouts from flash floods and heavy spring runoff.

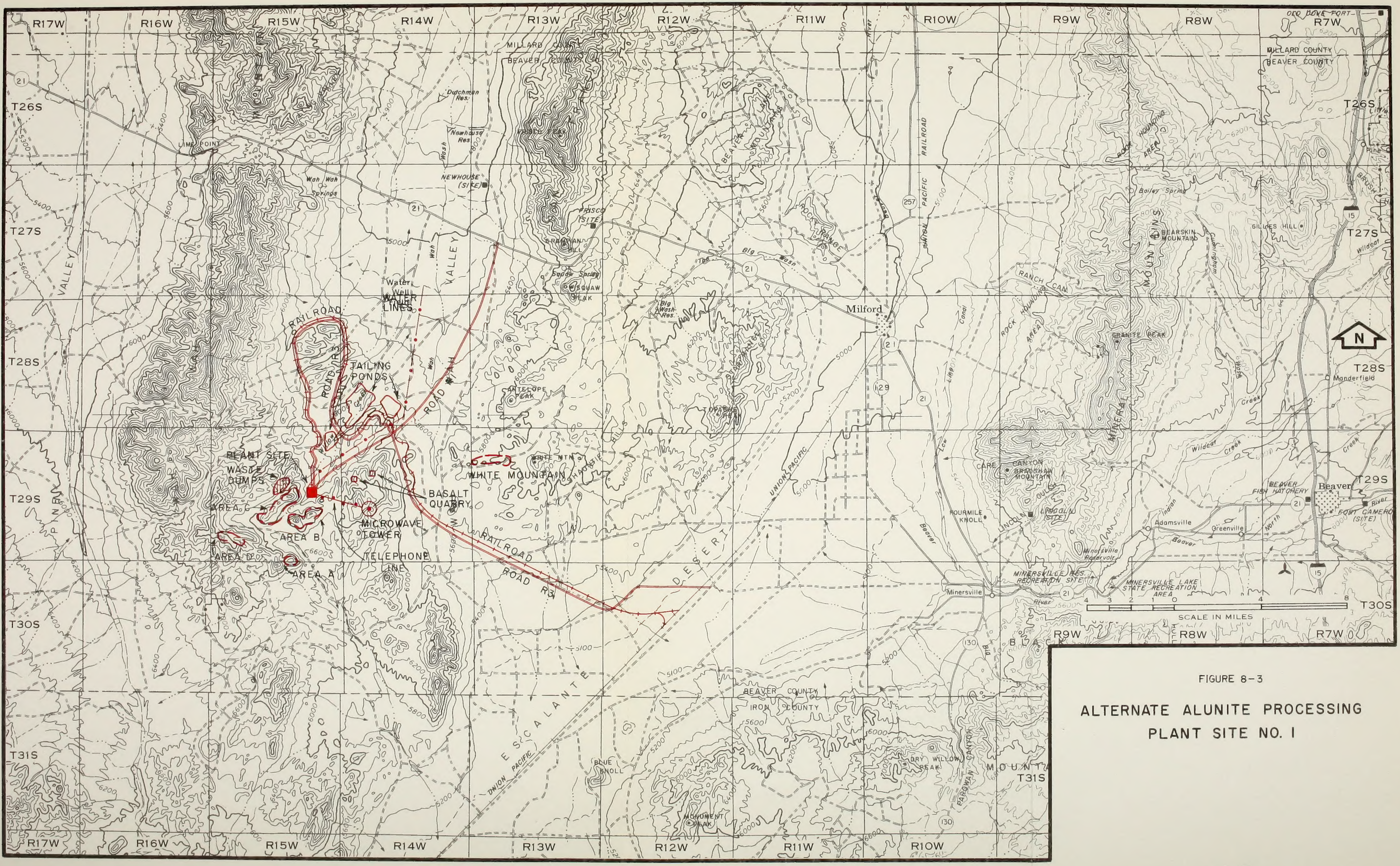

FIGURE 8-3

ALTERNATE ALUNITE PROCESSING PLANT SITE NO. I

Unavoidable adverse impacts.

1. An additional 190 acres of vegetation would be disturbed. This represents an 8 percent increase over the proposed site.

2. A total of 374 acres of the revegetated community would be occupied by this alternative compared to 15 acres for the proposed site. The revegetated community provides forage for deer and wild horses and 374 acres are approximately 5 percent of the revegetated acreage in the area of concern.

3. The loss of this 374 acres of revegetated community would result in the additional loss of 75 AUMs of livestock forage in the Bucket Ranch Allotment. This loss would represent about 4 percent of the total grazing use in the allotment.

4. An additional 1,224 acres of deer habitat and 359 acres of wild horse habitat would be disturbed.

Alternative processing plant site 2. Figure 8-4 shows the location of major components of the alunite development for alternative plant site 2.

Unmitigated impacts. The tailings ponds and structures of the processing plant complex for alternative site 2 could not be seen from Highway 21. The tailings ponds would be protected from wind by the surrounding mountains and less fugitive dust would occur during periods of high wind. As a result the visual impact would be less than for the proposed action.

The tailings ponds for this alternative would be vulnerable to flooding and washouts because of the potential for flash floods in this relatively large drainage. Washouts of the tailings ponds could result in loss of vegetation and contamination of surface water used by livestock and wildlife. Blawn Wash drains into the Escalante Desert and pollution of the ground water reservoir could occur from washouts and seepage from the tailings ponds. This would be a significant impact since water from this ground water basin is heavily used for irrigation and culinary supplies (see Hydrology section, Chapter 2).

Only 40 additional acres of vegetation would be disturbed by alternative plant site 2 than for the proposed site. However, plant site 2 would occupy 150 acres of the revegetated plant community compared to 15 acres for the proposed action. The revegetated community provides forage for deer and wild horses during the spring and fall. This 150 acres represents approximately 2 percent of the revegetated acreage in the area of concern. The loss of this portion of the revegetated area would result in the additional loss of 28 AUMs of spring/fall livestock forage in the Bucket Ranch Allotment. This loss would represent about 1 percent of the grazing use in the allotment.

Alternative plant site 2 would disturb 1,584 additional acres of deer habitat, 1,589 fewer acres of antelope habitat and 334 additional acres of wild horse habitat than the proposed action. As in the case of plant site 1, these differences are significant changes from the proposed action, but these habitat losses represent less than 1 percent of the available habitat for these species and they would not be expected to result in significant impacts to animal populations.

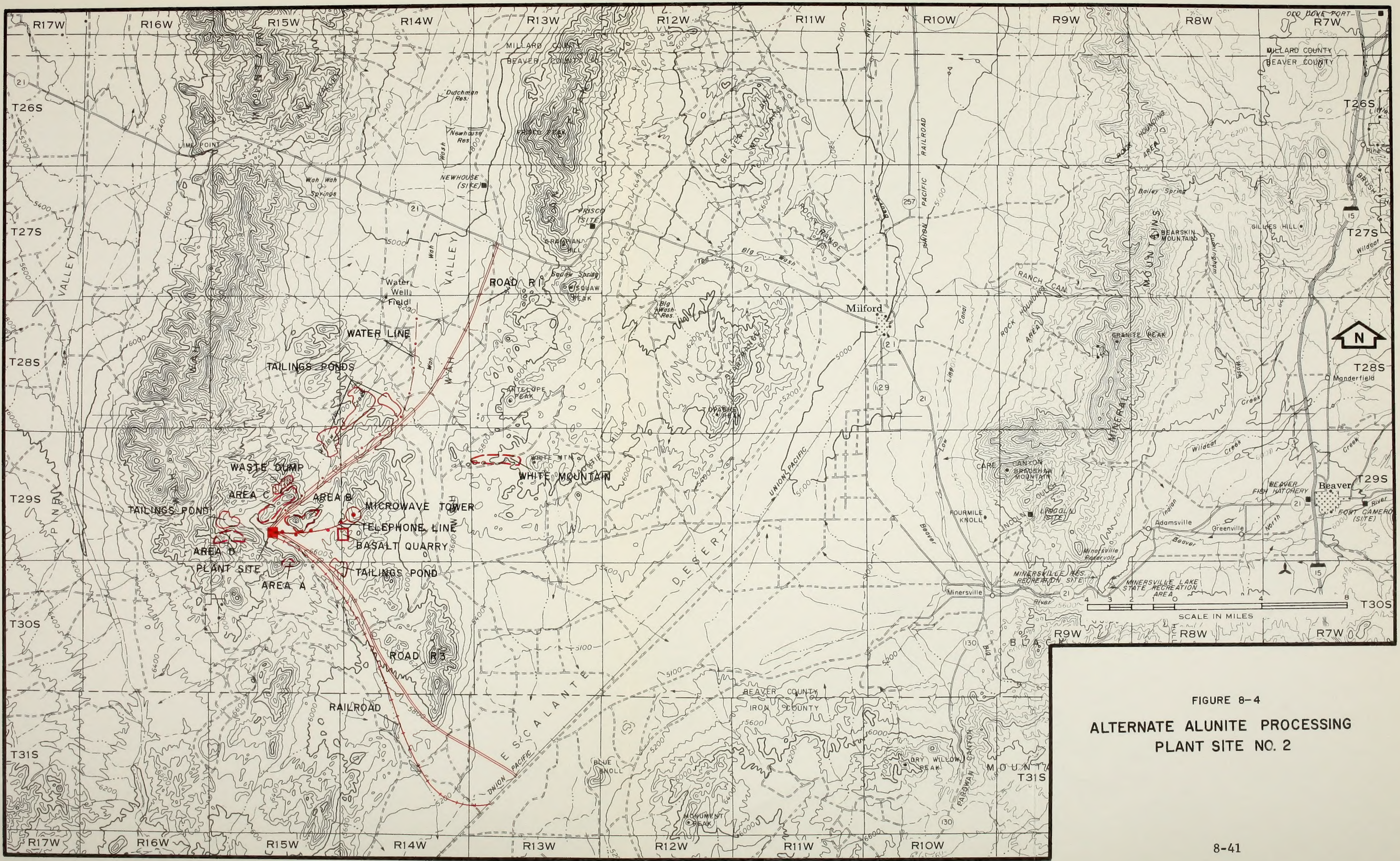

FIGURE 8-4

ALTERNATE ALUNITE PROCESSING PLANT SITE NO. 2

Mitigating measures. The tailings ponds could be lined with an impervious material to prevent seepage. Tailings ponds and dikes could be designed to eliminate the possibility of flooding and washouts.

Unavoidable adverse impacts

1. Disturbance of 40 additional acres of vegetation than would occur for the proposed action.

2. Disturbance of 150 acres of the revegetated plant community compared to 15 acres for the proposed action. The revegetated community provides forage for deer and wild horses and this loss represents approximately 2 percent of the revegetated acreage in the area of concern.

3. The loss of 150 acres of the revegetated community would result in the additional loss of 28 AUMs of spring/fall livestock forage in the Bucket Ranch Allotment. This loss would represent about 1 percent of the grazing use in the allotment.

4. An additional 1,584 acres of deer habitat and an additional 334 acres of wild horse habitat would be disturbed.

Alternative processing plant site 3. Figure 8-5 shows the location of the major components of the proposed alunite development for alternative plant site 3. This alternative plant site would be located in the Escalante Desert at an elevation of about 5,000 feet.

Unmitigated impacts. The distance from the alunite mine would require that ore be trucked a total of 25 miles. Additional air quality impacts, as described in Alternative ore transportation systems, would occur as a result of increased emissions from ore trucks.

The processing plant complex would not be visible from Highway 21 in Wah Wah Valley. It would be visible from the populated farming areas south of Milford and, on days with good visibility, from Milford (about 20 miles north) and Minersville (about 18 miles east). However, the railroad, utility lines, fences, and numerous roads are already present and the net impact on visual aesthetics would be less than for the proposed action.

The annual water requirement of 7,590 acre-feet for the processing plant complex would most likely be purchased from agricultural users in the Escalante Desert. As discussed in the section on Hydrology in Chapter 3, this ground water reservoir is already overobligated and the production from about 1,900 acres of irrigated cropland would be lost (4 acre-feet per acre). This would be a significant economic loss to Beaver County, resulting in an annual reduction of $456,000 in gross agricultural income. This impact would not occur if water were piped from the proposed Wah Wah Valley well field.

If plant site 3 was selected, an adjacent area would have to be used for tailings ponds. Since the prevailing winds are from the south, the tailings ponds could result in significant amounts of fugitive dust in Milford on windy days. Natural particulate levels in this area are already high (see Air quality section in Chapter 2) and additional particulates from the tailings ponds would result in higher particulate levels in Milford. Specific climatic data are not available for this alternative site and the intensity, duration, and frequency of this impact to air quality cannot be predicted.

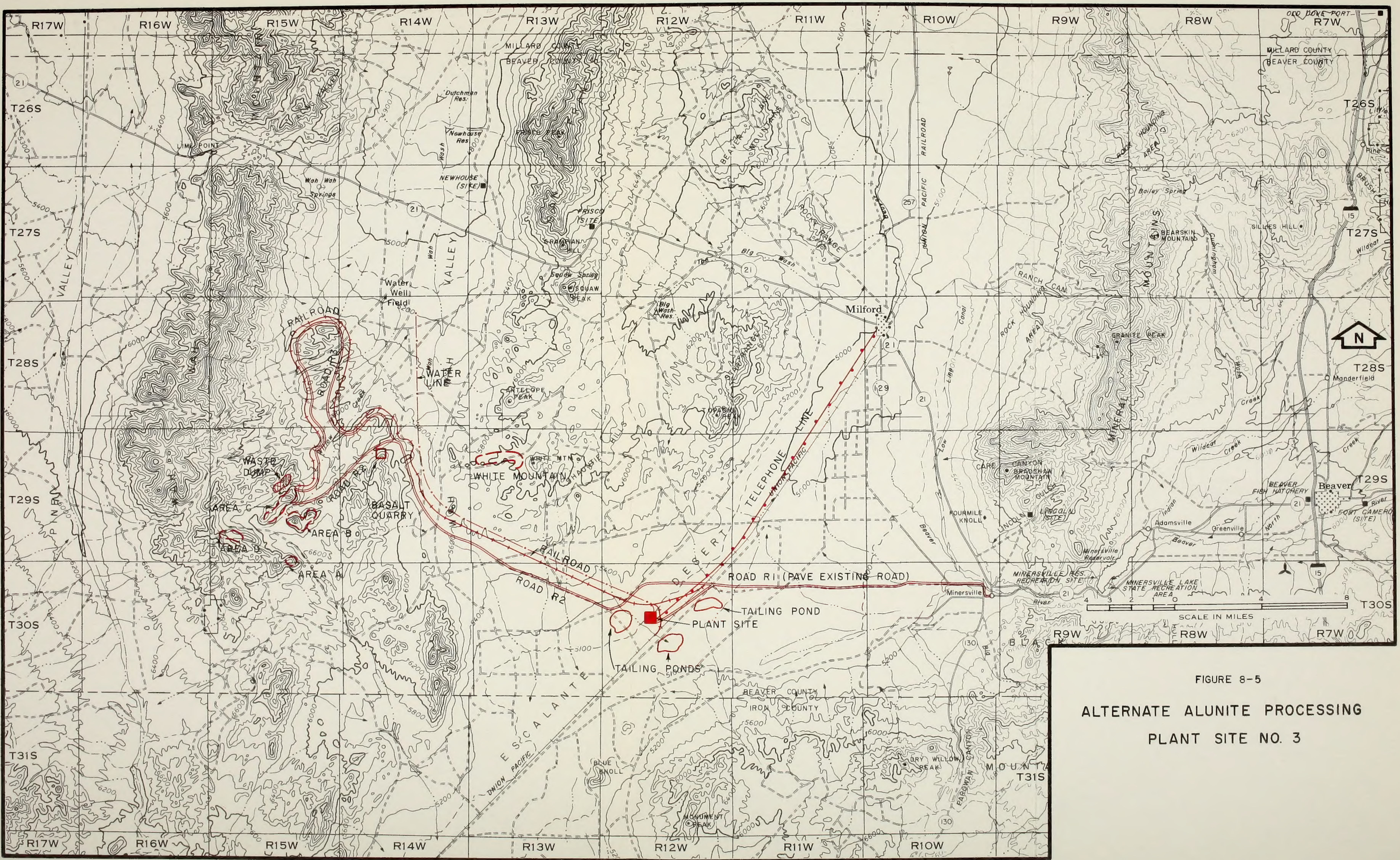

FIGURE 8-5

ALTERNATE ALUNITE PROCESSING PLANT SITE NO. 3

Contamination of the Escalante Desert ground water reservoir could occur from seepage from the tailings ponds or from washouts of tailings ponds by flash floods. This would be a significant impact because of the heavy use of this water for agricultural and domestic supplies. The chemical compounds in the tailings ponds (see Chapter 1) would significantly lower the quality of ground water if they entered the ground water reservoir in sufficient quantities.

Location of the processing plant at 5,000 feet elevation in the bottom of a large valley would increase the potential of poor dispersion associated with temperature inversions and very stable climatic conditions during the winter months. Complying with ambient air quality standards for sulfur dioxide, fluorides, and particulates would be more difficult and additional pollution control measures, such as higher stacks, additional scrubbers, and shutdown during limited dispersal conditions might be required. Because prevailing winds are from the south, the residents of Milford would be subject to emissions from the processing plant. Assuming that necessary controls would be implemented to insure that the proposed processing plant would comply with emission and ambient air quality standards, this would not be a significant impact.

An additional 313 acres of vegetation would be disturbed for plant site 3 than for the proposed site. Only 45 acres of the revegetated community would be disturbed in comparison with 15 acres for the proposed site. This difference is not considered to be significant in terms of deer and wild horse habitat or livestock forage.

Alternative plant site 3 would disturb 193 additional acres of deer habitat, 210 additional acres of antelope habitat and 78 additional acres of wild horse habitat than the proposed site. These differences are not expected to result in significant changes in impacts to major wildlife populations.

Mitigating measures. The potential contamination of the ground water reservoir by chemical compounds from the tailings ponds could be mitigated by lining the ponds with an impervious material. Adverse impacts to ambient air quality could be mitigated by additional pollution control measures or temporary shutdown of the processing plant.

Unavoidable adverse impacts.

1. Additional air quality impacts would result from increased emissions from ore-hauling trucks.

2. Unless water is piped from the Wah Wah Valley well field, water requirements would have to be purchased from agricultural users in the Escalante Desert and agricultural production from about 1,900 acres of irrigated cropland would be lost. This would be a significant economic loss to Beaver County, resulting in an annual reduction of $456,000 in gross agricultural income.

3. An increased particulate level in the air over Milford would occur as a result of blowing dust from the tailings ponds. The extent of this increase cannot be predicted because of a lack of data.

Summary of alternative plant site analysis. Table 8-7 summarizes the effect of major components of the proposed project for each alternative and the proposed plant site location. It should be noted that all the

Table 8-7. Quantitative summary of the physical components of the proposed alunite development for alternative plant sites and the proposed action

	Alternative site 1	Alternative site 2	Alternative site 3	Proposed action site 4
Main access road to plant - R1 (miles)	15	17	Pave existing road to Minersville	10
Disturbed area (acres)	150	170	Pave existing road to Minersville	90
Road from plant site to mine - R2 (miles)	1	1	21	5
Disturbed area (acres)	10	10	210	Within conveyor R/W
Road from plant site to U.P. railroad - R3 (miles)	36	18	19.5	20
Disturbed area (acres)	Within RR spur R/W	Within RR spur R/W	Within RR spur R/W	Within RR spur R/W
Railroad spur (miles)	36	18	36	21
Disturbed area (acres)	360	180	360	190
Conveyor (miles)	0	0	0	5
Disturbed area (acres)	0	0	0	64
Water lines (miles)	23	25	32[a]	18
Disturbed area (acres)	80	90	120[a]	66
Communication facilities Disturbed area (acres)	7	7	40	7
Balance of disturbed area (acres)	1,992	1,992	1,992	1,992
Total disturbed area (acres)	2,599	2,449	2,722	2,409

[a] Assuming water would be pumped from proposed well field in Wah Wah Valley.

alternatives would result in more disturbed acres than the proposed action.

In addition to differences in total disturbance for alternative plant sites, there would be differences in the types of vegetation and wildlife habitat that would be affected. Table 8-8 summarizes disturbance by vegetative communities and table 8-9 summarizes disturbance by major wildlife habitat. Impacts from this disturbance would be the same as those described in the impact analysis of the proposed action.

Table 8-8. Acres of each vegetative community that would be disturbed at alternate plant site locations

	PLANT SITE			
	Alternative site 1	Alternative site 2	Alternative site 3	Proposed action site 4
Pinyon-juniper community	766	1,954	553	460
Mixed shrub community	1,439	325	2,124	1,914
Shadscale community	20	20	0	20
Revegetated community	374	150	45	15
Total disturbance	2,599	2,449	2,722	2,409

Table 8-9. Total acres of major wildlife habitat that would be disturbed at alternative plant site locations

Plant site	Deer	Antelope	Wild horses
Alternative site 1	1,764	1,160	899
Alternative site 2	2,124	325	874
Alternative site 3	733	2,124	618
Proposed action site 4	540	1,914	540

ALTERNATIVE ROAD SYSTEM

Figure 8-6 shows an alternative road system for the proposed alunite project. This system would not replace but includes the road network described in Chapter 1 (Roads R1, R2, and R3), plus two additional roads. These two additional roads would provide direct access from the proposed plant site to Minersville and Cedar City. The proposed action would provide direct highway access only to Milford. Table 8-10 summarizes data on the alternative transportation system.

It is anticipated that the applicant would build and maintain the road from the processing plant to the alunite mine (R2) and the road from the processing plant to the railroad siding (R3). It is likely that the major access highway (R1) from Utah Highway 21 to the processing plant would be built and maintained by Beaver County. Beaver County

Table 8-10. Data summary for alternate transportation system (includes proposed road system)

	Road Description			
	Alternate access road from proposed road R3 to Cedar City	Alternate access road from proposed road R3 to Minersville	Proposed action (includes R1, R2, R3)	Total for alternate road system
Total length (miles)	44	13	35	92
Reconstruction (miles)	24	13	--	37
New construction (miles)	20	0	35	55
Disturbed acres resulting from new construction (acres)	194	0	340	534
Land status of new construction areas				
Private	10	0	3	13
State	4	0	3	7
National resource lands	6	0	29	35

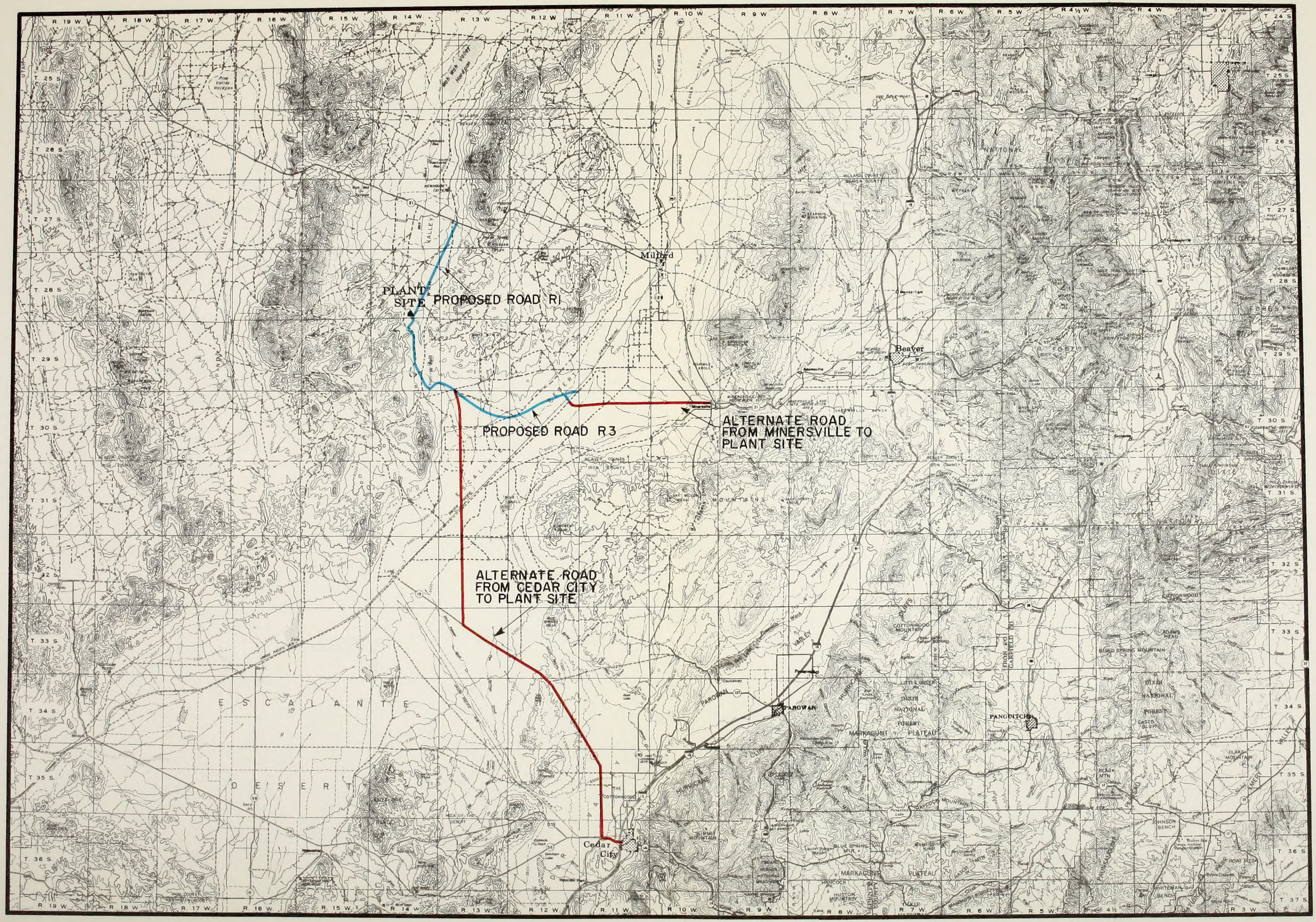

FIGURE 8-6

ALTERNATE ROAD SYSTEM

does not have the resources to build this major access highway and they are in the process of identifying potential sources of financial assistance.

At the present time there are no proposals from either the applicant or government agencies to build or reconstruct the alternate roads to Minersville and Cedar City. Officials of the State Highway Department have stated that the state cannot legally participate in the construction of any of the roads that would be required for the project. It is possible that Beaver County could reconstruct the 13 miles of road necessary to provide major access from Minersville. However, the alternate road from the proposed plant site to Cedar City would require participation by both Beaver and Iron counties. Beaver County would be responsible for 6 miles of new construction and Iron County would be responsible for 14 miles of new construction and reconstruction of 24 miles of the Lund Highway.

Construction of the alternate road to Cedar City would result in an additional removal of 58 acres of antelope habitat. The small increase would not be significant. No additional deer or wild horse habitat would be affected.

A total of 194 additional acres of vegetation and soil would be removed or disturbed by the alternate road system. This includes 19 acres of the shadscale community and 175 acres of the mixed shrub-grass community. This additional disturbance represents only a 7 percent increase in the amount of disturbance that would occur from the proposed project and would not result in a significant increase in impacts to soils or vegetation.

The alternative road system would reduce the driving distance between Cedar City and the plant site from 90 miles to about 54 miles. This shorter distance could induce a larger portion of the increased population to live in Cedar City. However, it is expected that increases in population to Cedar City would be relatively small since a majority of the employees at the alunite project would not be willing to drive 110 miles a day to and from work.

Any increase in the number of new residents living in Cedar City would increase the socioeconomic impacts. However, as discussed in the Socioeconomic section of Chapter 3, Cedar City has the capability to handle population growth and the small increase that would result from the alternate road system would not have a significant impact.

ALTERNATIVE COMMUNICATIONS

Telephone communications could be established using a ground line instead of the proposed microwave repeater site described in Chapter 1. A line could be buried along the Union Pacific Railroad line from Milford to the takeoff point of the proposed railroad spur. This line would connect with a line that would be buried within the railroad spur right-of-way to the processing plant site. The underground cable from the processing plant to the takeoff point could be installed during construction of the railroad spur.

No additional adverse impacts would result from installation of an underground telephone line within the railroad spur right-of-way. Minor impacts would occur in establishing a buried telephone line along the existing railroad line, specifically loss of vegetative cover and soil disturbance. Assuming that a strip 10 feet wide and 12 miles long would be disturbed, an additional 14 acres of vegetation and soil would be disturbed. However, since the proposed microwave repeater site would require disturbance of 7 acres, the net additional increase would be 7 acres.

The existing railroad line is located in an area where artificial revegetation would be impossible and restoration of disturbed areas would depend on natural revegetation.

ALTERNATIVE LAND ACQUISITION BY APPLICANTS

The 5,298 acres of land required for the processing plant complex could be acquired by a private exchange. Land of suitable value could be acquired by the applicant and exchanged with the Bureau of Land Management.

Impacts would be essentially the same as an exchange with the State of Utah. A potential beneficial impact could be the possibility of BLM acquiring private property that is critical for management of national resource lands. A preliminary evaluation of the lands offered by the State of Utah has not identified any critical resource values for these lands. Since offered lands for a private exchange have not been identified, specific impacts cannot be determined.

CHAPTER 9

CONSULTATION AND COORDINATION

CHAPTER 9

CONSULTATION AND COORDINATION

INTRODUCTION

The consultation and coordination with the public and other government agencies conducted during the preparation of this environmental statement are summarized in this chapter. Items discussed include a brief history; organization of the interagency team; federal, state, local, and public contacts; adherence to mandatory federal laws; and significant meetings that were held. Organizations that were sent a copy of the draft statement for review and written comments on its adequacy are listed. Those who responded with comments are also noted.

HISTORY OF CONSULTATION AND COORDINATION

On December 27, 1974, Alumet submitted an Environmental Impact Assessment to the Fillmore District Manager, BLM, on the proposed alunite project. The letter of transmittal stated that it was the intent of the company to pursue and secure all appropriate permits to allow implementation of the project. An interagency-applicant meeting was held on May 13-14, 1975. The purpose of the meeting was to identify any areas in which there was a need for supplemental information from the applicant. The Area Mining Supervisor, U.S. Geological Survey, identified the need for a more detailed mining plan. The Water Resources Division of U.S.

Geological Survey requested additional information on ground water supply and possible impacts to ground water. The Regional Director of the Bureau of Reclamation expressed concerns about the information provided on limestone conversion, air and water quality, biological data, aesthetics, atmospheric emissions, and revegetation. The Utah State Planning Coordinator identified the need for additional information on roads, transportation, land tenure, wildlife, and the impact of increased population on recreation use. The Regional Forester of the U.S. Forest Service requested additional information on the probable source of coal. The Director of the Bureau of Mines expressed concerns about the economics of alunite production and provided input on potential emissions. The Deputy Director of Health, Utah Bureau of Environmental Health, identified the need for additional information on potential air and water quality impacts, sanitation, and solid waste disposal. Written comments on the adequacy of the proposal were submitted to the Fillmore District Manager.

On May 30, 1975 Alumet responded with a written submission of answers to questions raised at the May 13-14, 1975 meeting. On June 23, 1975 BLM sent a letter requesting additional information on the proposal. Alumet responded to this request on July 18, 1975. The BLM requested and received additional information from Alumet on a continuing basis during preparation of the draft statement.

A series of meetings in May, June, and July of 1975 were held for the purpose of producing a statement preparation plan. The Bureau of Land Management (BLM) incorporated the input and review comments from other agencies into the draft statement preparation plan. The Director of BLM approved the statement preparation plan in October 1975 and directed the Utah State Director to take lead responsibility for the preparation of the alunite environmental impact statement. The Cedar City Environmental Project Office was given the responsibility for preparing the statement. The statement preparation team was assembled and started work on the statement in December 1975.

After publication and release of the draft statement, a series of meetings were held with representatives of BLM, Environmental Protection Agency, and the State Bureau of Air Quality. Since information in the draft raised the possibility that existing Class II air quality standards could be exceeded, it was felt that additional model verification was needed. Based on air quality modeling done by EPA and the State Bureau of Air Quality, it was agreed that the original proposed plant site would not allow compliance with either Class II or Class III standards. Modeling was completed for several other plant sites and it was found that moving the plant site about 1.5 miles to the northeast would ensure that Class III standards could be met. The State of Utah has subsequently applied to have the area redesignated from Class II to Class III and the applicant has submitted an amended processing plant site location.

ORGANIZATION OF THE INTERAGENCY TEAM

The interagency team organized to prepare the ES included personnel from BLM, the U.S. Geological Survey, and the Bureau of Mines. In

October, 1975 the interdisciplinary EIS team was organized under the leadership of a team leader in the Cedar City District Office, Cedar City, Utah. The Director of BLM sent a memorandum to the Director of the Bureau of Mines on November 14, 1975 requesting a team member to evaluate the processing plant portion of the proposed project. The Bureau of Mines named a team member on December 5, 1975. On November 10, 1975 BLM requested the U.S. Geological Survey to designate two team members to evaluate the hydrology and mining portions of the proposal. These team members were also named during December of 1975. The balance of the EIS team was composed of BLM personnel from Utah.

The team personnel represented broad categories of environmental expertise including metallurgy, air quality, soils, vegetation, hydrology, wildlife, socioeconomics, geology, mining, land uses, cultural resources, and scenic and recreational resources. The 13 team members utilized an interdisciplinary team approach in their analyses and writing during the preparation of the statement.

INTERAGENCY AND PUBLIC CONTACT ACTIVITIES

Federal contacts. Table 9-1 reflects the number and extent of federal contacts initiated and action completed in preparation of the draft statement.

Table 9-1. Federal contacts

Agency	Nature of Contact	Response Received	Action Taken
U.S. Forest Service	Request for data assistance	Yes	Provided data on recreation use
U.S. Geological Survey	Request staff & data assistance	Yes	Provided two staff members & data on mining, geology, and hydrology
U.S. Bureau of Mines	Request staff & data assistance	Yes	Provided one staff member & data on processing and emissions
National Park Service	Request data assistance & statement of interest	Yes	Provided data on recreation use and air quality
Soil Conservation Service	Requested data assistance	Yes	Provided data on soils and erosion potential
Federal Aeronautics Administration	Discussed permits & stack lighting	Yes	Provided requested information
Environmental Protection Agency	Request statement of interest, air quality data assistance, applicable regulations and standards for compliance with Federal Water Pollution Control Act and Clean Air Act (Sec. 309)	Yes	Provided requested information and data
U.S. Fish and Wildlife Service	Compliance with the Fish & Wildlife Coordination Act, Endangered Species Act, Sikes Act, Bald Eagle Protection Act; reqest data assistance	Yes	Provided wildlife data assistance; no jurisdictional problems were identified
Regional Solicitor	Discuss legal matters	Yes	Provided legal assistance
Bureau of Outdoor Recreation	Statement of interest; compliance with Land & Water Conservation Fund Act	Yes	Provided requested information

State contacts. Mr. Milton Weilenmann, Utah State Historic Preservation Officer was contacted in compliance with the National Historic Preservation Act, and his comments were considered in preparation of the statement. All divisions of Utah State Government having jurisdictional interests in the project have been contacted. The following state agencies supplied data and information:

Agency	Data or information supplied
Division of Health	Information on standards and regulations for air and water quality, sanitation, occupational health; air quality data
Division of Parks and Recreation	Recreation use data
Division of Wildlife Resources	Wildlife data, identification of potential impacts
Department of Transportation	Vehicle use data, maintenance and construction information
State Engineer's Office	Water rights information
Division of Oil, Gas and Mining	Information on Mined-land Reclamation Act
Division of Water Resources	Hydrologic data

The following state agencies were contacted for general information and coordination:

Office of the Governor

Office of the State Planning Coordinator

Division of Health

Division of State Lands

Department of Natural Resources

Utah State University

Southern Utah State College

Local contacts. Many public officials at the local level have been contacted concerning the proposed project. Their views and comments were considered in the preparation of the statement. The following have been consulted:

Five County Association of Governments
Beaver County Commission
Iron County Commission
Beaver County Planning Commission
Mayor and City Council of Milford, Utah
Mayor of Minersville
Mayor of Beaver
Mayor of Cedar City
City Manager of Cedar City
Beaver County School District
Iron County School District

The Beaver County Planning and Development Council provided a forum for close coordination and consultation with local officials in Beaver County.

Public meetings. Alumet officials conducted meetings on September 17, 1974 in Salt Lake City, Utah and on October 23, 1974 in Milford, Utah, to inform the public of the project.

The BLM held public meetings in Cedar City on March 30, 1976, in Milford on March 31, 1976, and in Salt Lake City on April 1, 1976. These meetings were held to give the public an opportunity to express their concerns about the proposed alunite project.

COORDINATION IN REVIEW OF THE DRAFT STATEMENT

The draft statement was sent to the federal, state, and local agencies listed below. These agencies have jurisdiction or expertise in the proposed action and potential environmental impacts. The draft statement was also sent to the nongovernmental organizations listed. Agencies and organizations who responded with comments are designated with an asterisk. Approximately 450 copies of the draft were distributed for public review and comment.

Federal agencies

Department of the Interior
    *Bureau of Reclamation
    *Bureau of Indian Affairs
    *Bureau of Outdoor Recreation
    *Fish and Wildlife Service
    *Geological Survey
    *National Park Service
    *Bureau of Mines
    *Mining Enforcement and Safety Administration
    *Office of the Solicitor
Department of Agriculture
    Forest Service
    *Soil Conservation Service
*Environmental Protection Agency
*Department of Health, Education and Welfare

- *Department of Commerce
  - *National Oceanic and Atmospheric Administration
- *Federal Aviation Administration
- *Department of Transportation
- *Federal Energy Administration
- *Department of Housing and Urban Development
- Department of Labor
  - Occupational Safety and Health Administration

State agencies

- *State of Utah
  - Office of State Planning Coordinator

Local agencies

- *Beaver County Commission
- City of Milford, Utah
- City of Minersville, Utah
- City of Beaver, Utah
- Iron County Commission
- City of Cedar City, Utah
- *Beaver County Planning and Development Council
- Five County Association of Governments

Nongovernment organizations

- *Alumet Company
- American Horse Protection Association
- Archeological Society of Utah
- Beaver County Cattlemen's Associaton

Beaver County Jeep Patrol

*Beaver County News

Beaver Press

Beaver Wildlife Federation

Brigham Young University

*Brouwer Construction Company

California Pacific Utilities

*Cannon Livestock Company

Cedar City Business and Professional Women's Club

*Cedar City Chamber of Commerce

Cedar City League of Women Voters

Cedar City Wildlife Federation

Color Country Spectrum

*Crone, Martie

Environmental Defense Fund

Escalante Valley REA

Escalante Wilderness Committee

*First Security Company

*Ford, Pat

Friends of the Earth

Guymon Livestock

*Hassell, Robert H.

Hatch Livestock

Iron County Cattlemen's Association

Iron County Record

*ISSUE

Kaiser Exploration and Mining Company

Lamoreaux Livestock

*Martin, Peter S. and Others

Lewis and Associates

Milford Chamber of Commerce

Milford Lions Club

Milford Wildlife Association

National Mustang Association

National Resource Defense Council

National Wilderness Society

National Wildlife Federation

*Persons, Melvin A.

Phillips Petroleum Company

Pro-Utah

*Representative Allan Howe

Rocky Mountain Center on Environment

Save Our Canyon's Committee

*Sierra Club

SWRCC Wilderness Society

*Tabor, Steve

*The Wilderness Society

Twin "M" Soil Conservation District

Utah Aubudon Society

Utah Association of Soil Conservation District

Utah Cattlemen's Association

*Utah Environmental Center

Utah Farm Bureau

Utah Gem Society

Utah Institute of Planners

Utah League of Women Voters

Utah Mining Association

Utah Nature Study Society

Utah Power and Light

Utah Sportsman's Association

Utah State University

Utah Wildlife and Outdoor Recreation Federation

Utah Wildlife Federation

Utah Woolgrowers

Wasatch Gem Society

Wasatch Mountain Club

Weber State College

WHOA

*Wintch Livestock

Women's Conservation Council of Utah

Public hearings or meetings. Public hearings were held in Milford, Utah on November 30, 1976 and in Salt Lake City, Utah on December 1, 1976. These hearings were presided over by an Administrative Law Judge and a transcript was made of the proceedings. The purpose of the hearings was to give interested citizens an opportunity to comment on the adequacy of the draft statement. Comments received from the public have been considered in the preparation of the final environmental statement.

PUBLIC REVIEW OF THE DRAFT ENVIRONMENTAL STATEMENT

The Cedar City District Manager, Bureau of Land Management received a total of 37 letters commenting on the draft environmental statement. Oral testimony was received from 14 people at the hearings held in Milford and Salt Lake City, Utah. Table 9-2 lists the agency, organization or individual who submitted written comments and Table 9-3 lists the individuals who testified at the hearings.

Written comments. All written comments and the hearing transcripts have been sent with the final environmental statement to the Secretary of the Interior and the Council on Environmental Quality. All comments were reviewed and considered in the preparation of the final environmental statement. Comments which presented new data, questioned facts and/or analyses, or raised questions or issues bearing directly upon the environmental effects of the proposed action were used in revising the text or were responded to in this section. In many cases, the response to comments indicates that recommended changes have been made in the final statement.

All the written comments received are reproduced in the following section. Substantive comments on the adequacy of the draft statement are designated by capital letters. The response to these comments is given on the other half of the page. In the case of comments which expressed approval or disapproval of the proposed action, or raised economic issues, no response has been made. However, all comments will be considered in the decision-making process.

Table 9-2. Comment letters received

Index Number	Agency, Organization, or Individual
1.	U.S. Department of Commerce
2.	U.S. Department of Transportation
3.	Federal Aviation Administration
4.	Utah Department of Development Services
5.	Melvin A. Persons, Sr.
6.	Robert H. Hassell
7.	Martie Crone
8.	Wintch Livestock
9.	Peter S. Martin and Others
10.	Lou Brouwer
11.	Utah Department of Transportation
12.	Steve Tabor
13.	Soil Conservation Service, U.S.D.A.
14.	Pat Ford
15.	U.S. Department of Health, Education and Welfare
16.	Congressman Allan T. Howe
17.	First Security Company
18.	Mining Enforcement Safety Administration, U.S.D.I.
19.	The Wilderness Society
20.	Federal Energy Administration
21.	Alunite Planning and Development Council
22.	Cannon Livestock Company
23.	Alumet Company
24.	National Park Service, U.S.D.I.
25.	Bureau of Reclamation, U.S.D.I.
26.	Fish and Wildlife Service, U.S.D.I.
27.	Bureau of Outdoor Recreation, U.S.D.I.
28.	U.S. Department of Commerce
29.	Bureau of Indian Affairs, U.S.D.I.
30.	Environmental Protection Agency
31.	U.S. Department of Housing and Urban Development
32.	Utah Environment Center
33.	Office of the Solicitor
34.	Utah State Planning Coordinator's Office
35.	Utah Division of Health
36.	Utah Division of Wildlife Resources
37.	Utah Department of Agriculture

Table 9-3. Individuals testifying at hearings

Speaker	Representing	Location
Garth Jones	Utah State Legislator	Milford
Royce Chamberlain	Cedar City Chamber of Commerce	Milford
N.E. Wilson	Self	Milford
Al Kirk	Milford Industrial Foundation	Milford
John Wintch	Wintch Livestock	Milford
William R. Tipton	Alumet Company	Milford
Fred Harris	Beaver County Commission	Milford
Ray Juvelin	Self	Milford
William R. Tipton	Alumet Company	Salt Lake City
Dale B. Carpenter	State Board of Industrial Development	Salt Lake City
Mike Homer	National Contractors Assoc.	Salt Lake City
Nina Dougherty	Sierra Club	Salt Lake City
Bob Bernick	Walker Bank and Trust Co.	Salt Lake City
Marious Gedgaugas	Environmental Protection Agency	Salt Lake City

①

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES
Boulder, Colorado 80302

OCT 2 0 1976

District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah

Dear Sir:

The Environmental Research Laboratories has no substantive comments on the draft environmental statement prepared on the Alunite project in Beaver County, Utah, at this time.

Sincerely,

Gordon Little, for

W. N. Hess
Director, ERL

cc: Dr. William Aron
Director of the Office
of Ecology and Environmental
Conservation

RESPONSE

1. U.S. Department of Commerce. No response required.

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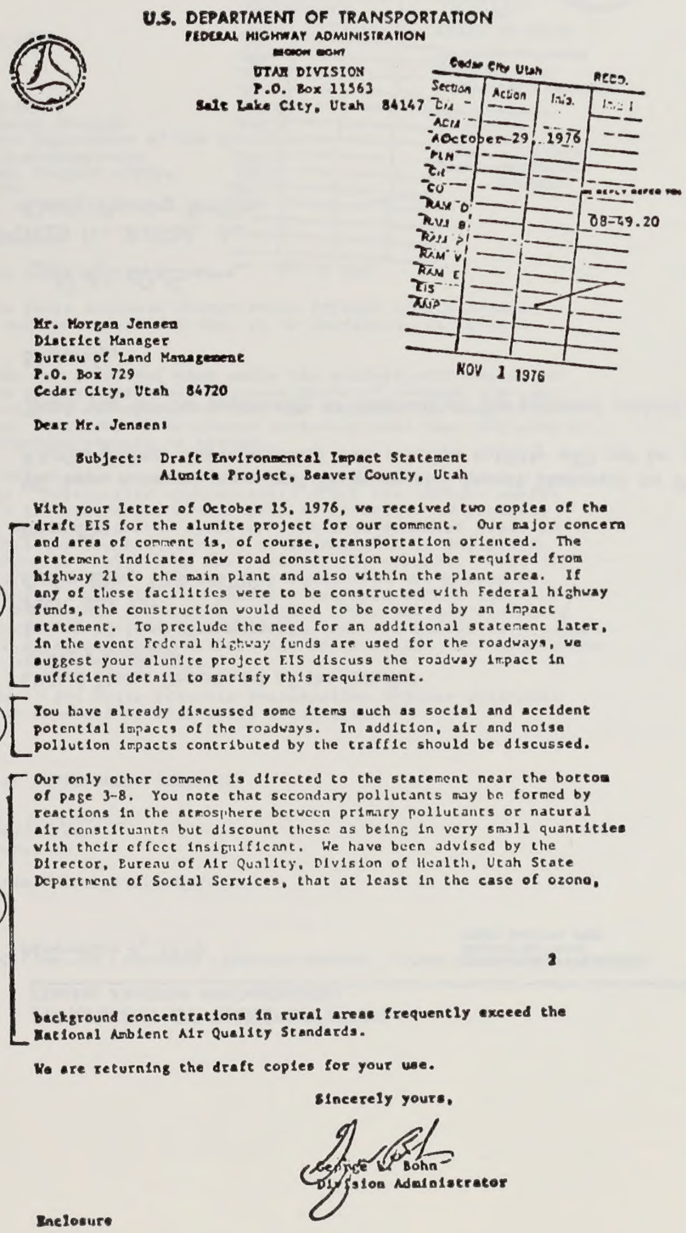


U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION EIGHT
UTAH DIVISION
P.O. Box 11563
Salt Lake City, Utah 84147

Cedar City Utah
Section | Action | Info. | Init. | RECD.
October 29, 1976
REPLY REFER TO
08-49.20
NOV 1 1976

Mr. Morgan Jensen
District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Dear Mr. Jensen:

Subject: Draft Environmental Impact Statement
Alunite Project, Beaver County, Utah

With your letter of October 15, 1976, we received two copies of the draft EIS for the alunite project for our comment. (A) Our major concern and area of comment is, of course, transportation oriented. The statement indicates new road construction would be required from highway 21 to the main plant and also within the plant area. If any of these facilities were to be constructed with Federal highway funds, the construction would need to be covered by an impact statement. To preclude the need for an additional statement later, in the event Federal highway funds are used for the roadways, we suggest your alunite project EIS discuss the roadway impact in sufficient detail to satisfy this requirement.

(B) You have already discussed some items such as social and accident potential impacts of the roadways. In addition, air and noise pollution impacts contributed by the traffic should be discussed.

(C) Our only other comment is directed to the statement near the bottom of page 3-8. You note that secondary pollutants may be formed by reactions in the atmosphere between primary pollutants or natural air constituents but discount these as being in very small quantities with their effect insignificant. We have been advised by the Director, Bureau of Air Quality, Division of Health, Utah State Department of Social Services, that at least in the case of ozone,

2

background concentrations in rural areas frequently exceed the National Ambient Air Quality Standards.

We are returning the draft copies for your use.

Sincerely yours,

George W. Bohn
Division Administrator

Enclosure

RESPONSE

2. U.S. Department of Transportation

A. The impacts associated with construction of all roads necessary for the proposed project are discussed in the draft statement. The road system is described in Chapter 1 and the impacts to air quality, topography, geology, hydrology, soils, vegetation, animals, cultural resources, aesthetics, land use, and socioeconomic conditions are described and evaluated in Chapters 3, 4, and 5. The statement provides information necessary for considering the requirements of section 4 (f) of the Transportation Act in the event federal funds were to be used.

B. The emissions and noise associated with increased traffic are not expected to result in significant changes to the existing environment in a majority of the area of concern. However, a statement discussing the effects of increased traffic on air quality and the noise level for Milford has been added to the transportation portion of the socioeconomic section.

C. The formation of secondary pollutants is discussed on pages 3-8, 3-21, and 3-22. With the available data, it is impossible to quantify their impact on air quality. Secondary pollutants probably would not add significantly to actual ground level concentrations of particulates. However, since most of these secondary pollutants would consist of very fine particles, they could have a significant impact on visibility and this is is discussed in the visibility section. Again, it is very difficult to be quantitative and no modeling calculations have been performed to evaluate potential visibility impacts. As to background ozone, measurements of ozone in recent years have revealed significant concentrations in rural areas, even exceeding ambient air quality standards. It has been observed that power plants deplete ozone in the atmosphere for some distance downwind, but may become net producers of ozone at larger distances. It is hypothesized that the ozone is consumed in the chemical conversion of metric oxide to nitrogen dioxide. More research is needed in the complex role of ozone in the chemical transformation of pollutants. Ozone is discussed in more detail in the final statement.

3

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ROCKY MOUNTAIN REGION
10455 EAST 25TH AVENUE
AURORA, COLORADO 80010

November 4, 1976

United States Department of the Interior
District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Dear Sir:

We have reviewed your draft Environmental Impact Statement on the proposed Alunite project and determined that aviation activity will not be impacted.

Thank you for the opportunity to comment on the proposed project.

Sincerely,

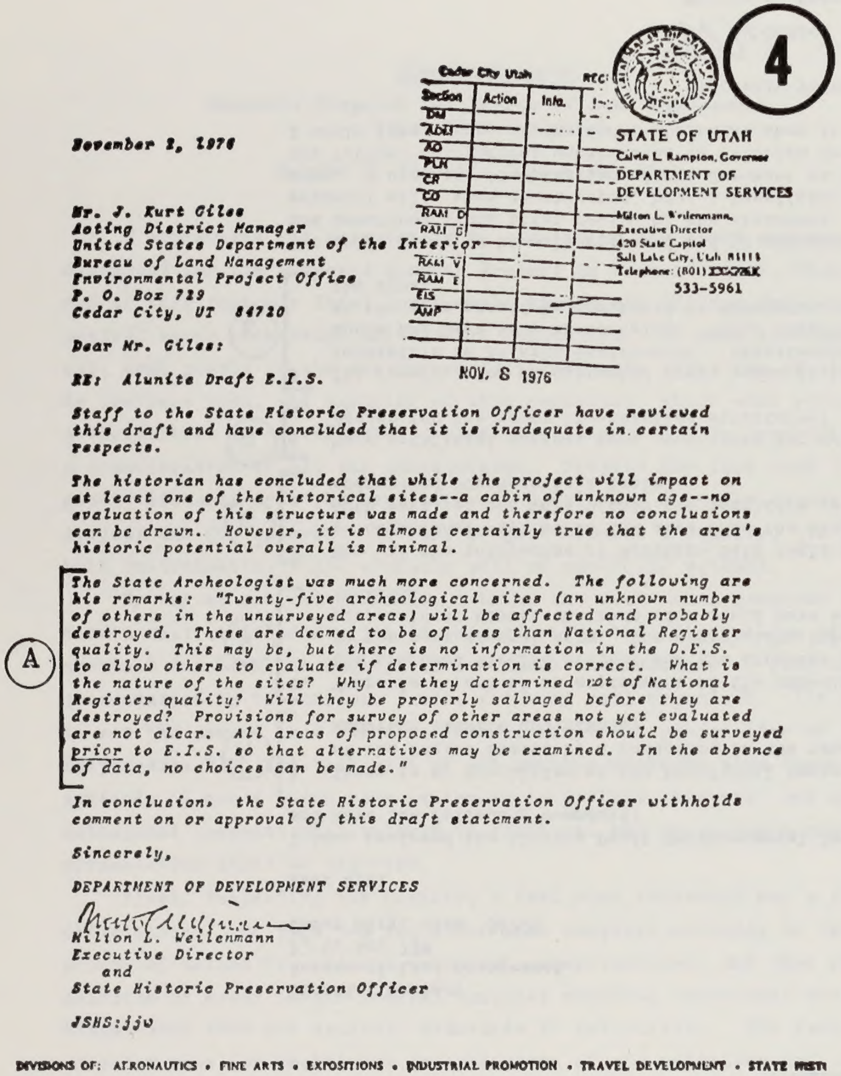
L.K. Olson

for: FRED H. JAEGER, Jr.
Chief, Planning Staff

RESPONSE

3. Federal Aviation Administration. No response required.

④



Cedar City Utah

NOV. 8 1976

STATE OF UTAH
Calvin L. Rampton, Governor
DEPARTMENT OF
DEVELOPMENT SERVICES
Milton L. Weilenmann,
Executive Director
420 State Capitol
Salt Lake City, Utah 84114
Telephone: (801) 533-5961

November 2, 1976

Mr. J. Kurt Giles
Acting District Manager
United States Department of the Interior
Bureau of Land Management
Environmental Project Office
P. O. Box 729
Cedar City, UT 84720

Dear Mr. Giles:

RE: Alunite Draft E.I.S.

Staff to the State Historic Preservation Officer have reviewed this draft and have concluded that it is inadequate in certain respects.

The historian has concluded that while the project will impact on at least one of the historical sites--a cabin of unknown age--no evaluation of this structure was made and therefore no conclusions can be drawn. However, it is almost certainly true that the area's historic potential overall is minimal.

Ⓐ The State Archeologist was much more concerned. The following are his remarks: "Twenty-five archeological sites (an unknown number of others in the unsurveyed areas) will be affected and probably destroyed. These are deemed to be of less than National Register quality. This may be, but there is no information in the D.E.S. to allow others to evaluate if determination is correct. What is the nature of the sites? Why are they determined not of National Register quality? Will they be properly salvaged before they are destroyed? Provisions for survey of other areas not yet evaluated are not clear. All areas of proposed construction should be surveyed prior to E.I.S. so that alternatives may be examined. In the absence of data, no choices can be made."

In conclusion, the State Historic Preservation Officer withholds comment on or approval of this draft statement.

Sincerely,

DEPARTMENT OF DEVELOPMENT SERVICES

Milton L. Weilenmann
Executive Director
and
State Historic Preservation Officer

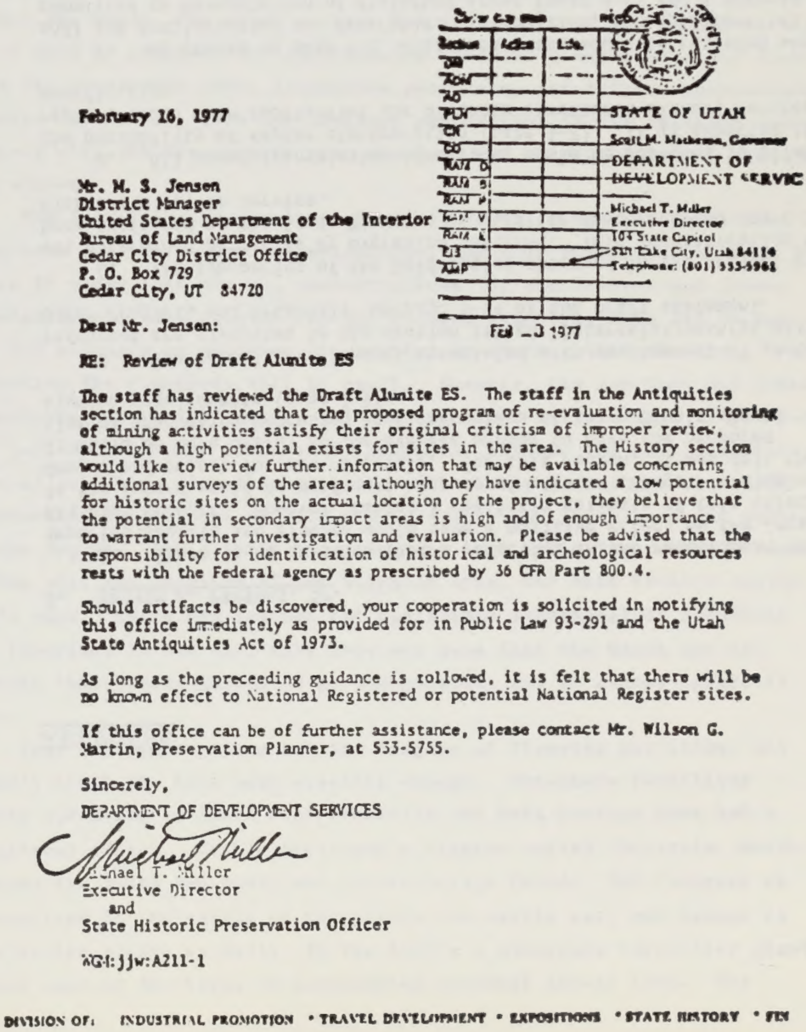
JSHS:jjw

DIVISIONS OF: AERONAUTICS • FINE ARTS • EXPOSITIONS • INDUSTRIAL PROMOTION • TRAVEL DEVELOPMENT • STATE HISTORY

RESPONSE

4. Department of Development Services

A. The section on mitigating measures for impacts to archaeological resources in Chapter 4 has been expanded to provide for survey, evaluation, and appropriate salvage of all areas proposed for construction. All sites would be evaluated for National Register potential. The applicant would be required to have a professional archaeologist onsite during construction to reduce the potential for destruction of unknown sites. The revisions made in the draft letter were sent to the Department of Development Services for review. They responded with the letter which is shown below.



FEB -3 1977

STATE OF UTAH
Scott M. Matheson, Governor
DEPARTMENT OF
DEVELOPMENT SERVICES
Michael T. Miller
Executive Director
104 State Capitol
Salt Lake City, Utah 84114
Telephone: (801) 533-5961

February 16, 1977

Mr. M. S. Jensen
District Manager
United States Department of the Interior
Bureau of Land Management
Cedar City District Office
P. O. Box 729
Cedar City, UT 84720

Dear Mr. Jensen:

RE: Review of Draft Alunite ES

The staff has reviewed the Draft Alunite ES. The staff in the Antiquities section has indicated that the proposed program of re-evaluation and monitoring of mining activities satisfy their original criticism of improper review, although a high potential exists for sites in the area. The History section would like to review further information that may be available concerning additional surveys of the area; although they have indicated a low potential for historic sites on the actual location of the project, they believe that the potential in secondary impact areas is high and of enough importance to warrant further investigation and evaluation. Please be advised that the responsibility for identification of historical and archeological resources rests with the Federal agency as prescribed by 36 CFR Part 800.4.

Should artifacts be discovered, your cooperation is solicited in notifying this office immediately as provided for in Public Law 93-291 and the Utah State Antiquities Act of 1973.

As long as the preceeding guidance is followed, it is felt that there will be no known effect to National Registered or potential National Register sites.

If this office can be of further assistance, please contact Mr. Wilson G. Martin, Preservation Planner, at 533-5755.

Sincerely,

DEPARTMENT OF DEVELOPMENT SERVICES

Michael T. Miller
Michael T. Miller
Executive Director
and
State Historic Preservation Officer

MGM:jjw:A211-1

DIVISION OF: INDUSTRIAL PROMOTION • TRAVEL DEVELOPMENT • EXPOSITIONS • STATE HISTORY • FIN

⑤

9437 No. 37th Avenue
Phoenix, Arizona 85021
November 18, 1976

District Manager
Bureau of Land Management
P. O. Box 729
Cedar City, Utah 84720

Dear Sir:

I have reviewed the Alunite Draft Environmental Impact Statement and have the following comments:

Ⓐ 1. There is no discussion of the beneficial impact on the G.N.P. of the United States by a reduction in the requirement for imported bauxite and alumia.

Ⓑ 2. There is a lack of an assessment of the commulative impact of the proposed alunite project and the proposed geothermal resources in the same general area. The commulative impact of these two proposals at almost the same time could have significant additional impacts.

Ⓒ 3. How was the subspecies of Northern Bald Eagle determined to be an occasional visitor to the area when the area is south of the 40th parallel and well within the territory established for the endangered Southern Bald Eagle?

Ⓓ 4. Have artificial perches been considered for raptors as part of the design for the power transmission structures?

Ⓔ 5. The revegetation of disturbed areas seems to be discounted as impossible in an arid environment. Experiments in similar environments has been very encouraging. These experiments along with some at the site should be monitored to determine their suitability for the area.

The draft seems to be well prepared and my comments are only suggestions and questions I had after review of the statement. Hopefully the proposal will, when constructed, have a beneficial impact on the entire area. I urge the finalization of the document as soon as possible as any further delay seems unwarranted in relation to our national interests. I would like a copy of the final statement when it is completed.

Sincerely yours,

Melvin A. Persons

Melvin A. Persons, Sr.

RESPONSE

5. **Melvin A. Persons, Sr.**

A. There is no question that a reduction in the requirement for imported bauxite and alumina would have a positive effect on the Gross National Product. However, making a realistic estimate of this effect in the future would be difficult because of unknown changes in aluminum demand and prices for raw materials. For this reason, it was felt that it would be more useful to the average person to have the proposed alumina production expressed as a percentage of the nation's annual alumina requirements (page 1-9).

B. The cummulative impacts associated with development of geothermal resources are discussed in the section titled "Interrelationships With Other Projects and Proposals" on page 1-94 of the draft statement.

C. The subspecies of the Bald Eagles observed in the project area was determined primarily by migration patterns. This identification has been confirmed by the State Division of Wildlife Resources and the U.S. Fish and Wildlife Service.

D. All power transmission structures would be designed to eliminate the possibility of raptor electrocution (page 4-2). It is expected that raptors would make substantial use of these structures without further modification.

E. As stated on page 4-2, disturbed areas would be reseeded where soil and precipitation are favorable. In addition, the applicant has committed to revegetation of disturbed areas (page 4-6) and a program of ongoing research in revegetation studies (page 4-7). The probability of successful revegetation of disturbed areas is low and the draft statement presents the "worst case" viewpoint. BLM resource specialists continually monitor revegetation research and new developments can be implemented at any time during the project life to increase the probability of successful revegetation of disturbed areas.

⑥

Alunite Project

Comments Prepared for Bureau of Land Management
Cedar City District
by
Robert H. Hassell; Panguitch, Utah

I appreciate the opportunity to comment on the draft environmental statement for the proposed Alunite Project in Beaver County, Utah. As one of this region's first large-scale mining and milling proposals, the project needs a thorough and careful evaluation. As your statement points out, most people in the region are satisfied with their way of life here in southern Utah, and anything of this magnitude, which will strike like a thunderbolt at the effected communities, should not be undertaken without a consideration of all the consequences. Despite the fact that I live a goodly distance from the project area, I maintain a lively interest in the project and its outcome. If this project becomes a reality, its ramifications both environmentally and socially will be carefully watched.

By way of general comments, I think the team which prepared the EIS has done a most satisfactory job of investigating the consequences of the proposal for both the biological and human environment. I find the presentation to be consise, fluid, and very well organized. I'm pleased to see the amount that has been learned since the preparation of the Kaiparowits EIS, and that most of the serious mistakes made there have been avoided. I don't think your statement is perfect, however, and my subsequent comments will attempt to point out the areas where your presentation might be improved.

First, respecting air quality, I feel your statement has a few deficiencies. On page 3-9 you state that computer modeling is the only practical method to estimate pollutant concentrations, and then you describe at great length several computer modeling techniques which your comparisons show are scarcely standards of reliability. The fact is that computer modeling techniques as predictors of air pollution and its movement through the atmosphere are still very much in their infancy. They do very well when asked to predict dispersal patterns and changes in those patterns under different atmospheric conditions. They are virtually useless for giving specific numbers, and we are a long way from having any reliable way of predicting actual emission concentrations at any point except the top of the stack. However, your use of several models together with notes on their validity for existing situations rectifies the situation somewhat and at least gives us some idea of what to expect about emissions from this project.

Ⓐ Your preditions are somewhat disconcerting. When I began reading your statement I expected that with modern technology used to a maximum extent there would be no problem meeting applicable regulations for a Class II airshed, but you section on air quality makes it clear that such is not the case. The chart on page 3-4 shows us that the emissions will be at 100% of standard for particulates from the power plant, and fluorides from the phosphoric acid, diammonium phosphate, and triple superphosphate plants. Therefore, even the smallest malfunction in the emission control devices will put the amounts over standard and therefore beyond what the law allows.

Ⓑ The law also sets standards for pollutants in the air, both for long-term and short-term concentrations, and your conclusion on page 3-18 makes it clear that the SO_2 concentrations for the 24-hour and 3-hour standards, and particulates for the 24-hour standard, will not be met. The EIS attempts to minimize the problem by stating that the area exceeding the standards will be small. However, the law does not allow exemptions for "small" areas, and the standards are the law. Pages 3-20 and 3-21 make it very clear that fluorides, perhaps the most dangerous form of pollution from this project, will easily exceed the standards science has established as safe and tolerable for the plants and animals of the region. The attempt is again made to dismiss the problem because of the size and location of the blighted area, but such tactics simply won't wash. While EPA has not set applicable concentration standards for fluorides in the air, this does not mean that the Clean Air Act intends this deadly poison to go unregulated, and we cannot ignore it here.

Ⓒ Your statement points out the dangers of fluoride pollution, but I don't think you have been specific enough. Phosphate fertilizer plants operating in Idaho near Pocatello and Soda Springs have had a disastrous effect. Cattle developed a disease called fluorosis, which deforms the teeth and bones and is eventually fatal. The fluoride is transmitted to the cattle by the plants the cattle eat, and damage is done to the plants as well. In the 1960's a phosphate fertilizer plant killed most of the trees on surrounding national forest land. The

Ⓒ solution to these disasters in prior cases has been for the fertilizer company to buy up most of the surrounding land, but in this case, with the project located on public land, this solution will be impossible. Now, I realize that the project will control much of the fluoride emissions, but the EIS makes it very clear that even minimal health standards will be approached or exceeded. There is no mention of the possible persistence of fluoride in the environment, no indication of whether the poison is cumulative in plants and animals, and no hint of its path through the ecosystem. Certainly more information needs to be included on this particular pollution problem.

Ⓓ Your table on page 3-4 is valuable as a guide to where in the complex the pollution is comming from, but certainly the damage pollution does is not dictated by its source. We also need some information in the EIS on the total pollution from the project for each major chemical being emitted, together with the applicable Class II regulations, where they exist, for each pollutant.

Ⓔ Finally, we have no indication of what will happen if, as you predict, Class II regulations for SO_2 and particulates cannot be met. Is the company going to be required to post a performance bond on the operation of its abatement machinery? If pollution standards are not met, will the appropriate federal agency require that the offending operations close or curtail operation, or will some public interest group Ⓕ be required to go to court to see that the law is enforced? Finally, why is the BLM even considering the granting of the necessary permits for a facility it predicts will end by violating the law? Why aren't modifications Ⓖ in plant design being required to see that the operations of the complex are well within Class II regulations? I will have more specific suggestions on possible modifications of the operation later on in my comments.

I think your comments on the disturbance of vegetation and the chances of re-seeding are very realistic. I am quite disturbed at the prospect of open pit mining, and appreciate your fair appraisal of the effects of this technique out here.

Ⓗ You have made a half-hearted attempt at analysing the socio-economic impact of the project, but far too many items of significane have been glossed over or left out all together. Of the towns in the area, Milford is the only one which approaches anything like a cosmopolitan character, but even here the effects on the native population will be catastropic. Pages 3-76 and 3-77 state that project wages will be double those now being paid in the area. While this looks like a fine boost for the local economy, the blessing will be mixed. Wages paid by local business must rise to compete with project wages, and prices for locally available services will skyrocket as a result. Many local businesses will be unable to compete and will simply disappear.

Ⓘ Housing will be short as the project begins (page 3-88), and even garages and attics will rent for high prices. Property values and their associated taxes will rise accordingly, and those residents who are retired or otherwise living on fixed incomes will face a bleak future in communities they have come to love. Many will simply be forced to leave.

Ⓙ The influx of new residents will turn Milford into a booming construction town, with all the associated problems this will bring. A camp of "singles" at the project site itself will be a special hazard, as Cedar City, Milford, and Beaver will be destinations for the traditional "Saturday night drunk." The quiet havens of solitude many local people treasure in their communities will disappear as mist in the morning. Many southern Utah people don't realize it, but they are a special, rare group of people with a particularly fragile style of life. The amount they will loose as a result of the influx of new, and often temporary, residents will scarcely compensate for the financial blessings the project will bring. Your EIS rates residents' opinions of their communities as very high. I have, therefore, little doubt that local enthusiasm for the project is based on a very naive belief that most things will continue as before. Your EIS should present a more realistic appraisal of the true situation.

Ⓚ Your evaluation of the water situation with respect to Milford is muddled. On page 2-39 you state that Utah will not allow the appropriation of additional ground water in the Milford area, and therefore the huge increase in culinary requirements for the project will have to come from the purchase of existing water rights, all of which are now being used to irrigate cropland. This is the last we hear of the problem in the EIS. In fact, on page 3-30 you confidently state that the additonal water requirement in the Milford area will come from additional withdrawal from the ground water reservoir. I find these two statemnts impossible to reconcile, and, in fact, the expansion of Milford will undoubtedly de-water the irrigated cropland in the Escalante Valley. Obviously, a

Ⓚ culinary use of the water is a more financially valuable use, but the crops and pasture are the foundation of the area's lifestyle. Without the water there can be no agriculture in the valley, no matter how much public land is available for range. This is just one more example of how the spreading ripples from this project will change many things no one really expected to be changed.

The section on alternatives is the weakest part of the EIS. The alternatives presented are not really alternatives at all, but simply cosmetic re-arrangements of the planned facilities. While such rearrangements are worthwhile looking at, they do not satisfy the requirements of the law as NEPA sets them out. The alternatives evisioned in the law are to be major alternatives which will result in a substantially different project. No attempt at such is made here, so I am going to propose some directions for your investigation, as I promised to do in my comments on the problems with air quality.

This project as outlined in chapter 1 is not an organic unity, but
Ⓛ actually a mish-mash of several plants which belong together only in the corporate minds of the Alumet Company. The alunite processing facility, the real reason the whole project is to be here at all, is joined with a whole series of fertilizer processing plants. The phosphate component of these plants is to come from far-off Idaho, and it is never made clear why the fertilizer must be manufactured here. Granted, the association of alunite processing with fertilizer manufacture is convenient, but no case is made for its necessity. In addition, the chart on page 3-4 makes it clear that almost all of the fluoride pollution and some of the sulphur problem associated with the complex is caused by the fertilizer plants. I therefore respectfully suggest that your final draft explore the possibilities of not building the associated fertilizer plants. This would solve the problem of fluoride pollution, and possibly bring the project into a safer compliance with the law on other emissions as well.

To conclude, I wish to make some comments on the state of current publicity on the project being spread about by BLM functionaries associated with it. On page 9 of the November 5, 1976 issue of High Country News, one BLM official is quoted as saying that the project will have no problem meeting Class II standards, but the draft EIS states otherwise. On page 8 of the same publication the same official is quoted as saying "The only negative comment I've heard is, 'Why is it taking so long to approve the project?'" Now, I don't object to government officials making public statements about a project whose approval they are weighing, but it would be nice if those statements were at least objective and sounded less like they were Alumet Corporation press releases. In November, 1975 I was asked to submit comments about any concerns I had with the project, and I responded quickly with several pages of comments. I stated then, as I do now, that this was a project I wanted to support, but that support was conditioned on the solution to a number of environmental and social concerns. Shortly thereafter BLM was quoted by the Salt Lake Tribune as saying that they had received no negative comments. My 1975 comments were never acknowledged, and maybe never read, but if you need some negative comments now, my statement here contains a bushel-full.

The same BLM official is quoted by High Country News as saying that, "Unless someone has a specific interest in preserving an area from development and pollution you don't get conflict." Let the record be set straight from here on - an area does not have to be in the center of the "Golden Circle" to be of concern. I have no objection to maintaining Wah Wah Valley as a Class II air quality area, but that does not mean I am ready to accept pollution beyond a Class II standard for even a single acre of cliff face, blackbrush, or bare rock. I am not opposed to responsible development within southern Utah, but this does not mean that I have no "specific interest in preserving an area from ... pollution." Some pollution is a necessary and acceptable adjunct to industrial development, but, thank goodness, there are standards of what levels of pollution can be tolerated. Unless this project can be sure of meeting these standards, therefore, no government agency has any business granting its approval. If this project can be designed to bring its emissions into line with lgal standards then I will have no objection to its construction, and this is not because I don't care, but because I do, and very intensely. Developers have stated for years that we can have responsible industry without unacceptable levels of pollution. With the Alunite Project it's time they proved they are right.

RESPONSE

6. Robert H. Hassell

A. It is true that emissions would be at about 100 percent of the standards for some of the plants. These rates are projected by the applicant to be as low as possible using the best available control technology. Emissions from these sources would have to be monitored very closely as specified in the proposed monitoring program in Chapter 1. Any malfunction of equipment would have to be dealt with according to the procedures outlined on pages 3-7 and 3-8.

B. The purpose of the draft statement was not to minimize the potential air quality impacts, but to disclose as much information on potential impacts as possible. For this reason, the size and location of the area where concentrations would exceed Class II standards was identified. Because projected concentrations would apparently exceed the standards, the applicant was forced to relocate the proposed processing plant to a site about 1.5 miles further away from the mountains. The analysis in the final statement indicates that the new plant site would meet ambient air quality standards, but would still not meet Class II standards under the Prevention of Significant Deterioration Regulations. The new plant site would also alleviate the fluoride pollution problem considerably. The projected long-term fluoride concentrations would fall below the standard set by the State of Washington, and would not be likely to exceed generally recognized threshhold levels.

C. Information on fluoride pollution with direct application to the proposed alunite project is relatively limited and an attempt has been made to evaluate the potential situation with available data. The persistence, cumulative properties, and ecosystem effects of fluoride compounds are discussed in pages 3-18, 3-19, and 3-20 of the draft statement.

D. Total emissions for each major chemical compound are summarized on page 1-90 and 1-91 of the draft statement. The projected maximum ground level concentration that would result from these emissions is compared with Federal Ambient Air Quality Standards on page 3-16 and with Class II Significant Deterioration Standards on page 3-17.

E. Both the State of Utah and the Environmental Protection Agency have stated that unless appropriate air quality standards can be met, the applicant would not be issued the necessary permits to begin construction of the proposed project. The State of Utah and the EPA have the necessary enforcement powers under the terms of the Clean Air Act to insure compliance with pollution standards during operation of the processing complex.

F. The original air quality information submitted by the applicant indicated that Class II standards would be met. After evaluation and model verification by the State of Utah, BLM, and EPA, it was apparent that Class II standards could be exceeded because of plume impingement on adjacent high terrain. The purpose of an environmental statement is to evaluate and disclose the potential impacts that would result from the proposed action. The environmental statement is only one of the factors involved in the decision whether to approve the proposed action. Compliance with existing statutes and regulations is absolutely necessary and would be considered in the final decision.

G. The applicant has proposed to use the best available pollution control equipment in the design of the plant. The only solution to the problem of plume impingement is to move the processing plant away from the high terrain. The final statement will show that the plant site has been moved approximately 1.5 miles to the northeast. According to diffusion modeling done by the state and EPA, this would ensure that Class III standards would not be exceeded. The State of Utah has initiated action to reclassify the area as Class III under EPA's Prevention of Significant Deterioration Regulations.

H. Chapter 3 has been changed to reflect the fact that local businesses would probably have to pay higher wages to compete with project wages. Increased prices of local goods and services were addressed on page 3-87 in the draft statement. It is not felt that there is a strong possibility of local stores going out of business as a result of increased prices and wages.

I. Substandard housing and increased property values were discussed on page 3-84 in the draft. The problem of increased prices on residents with fixed incomes was discussed on page 3-87 in the draft.

J. It is felt that impacts to quality of life are adequately addressed. Although residents' opinions of their communities are very high, the fact that they may change as a result of the project is discussed. Possible value conflicts, community strain, and a degraded quality of life are also discussed in Chapter 3.

K. An increase in the culinary water requirements for the Milford area would very likely require the use of water that is presently being used for irrigation of cropland. The probable extent and significance of this impact has been added to the impact assessment in the final statement.

L. It is extremely difficult to identify and evaluate alternatives to a pioneering type proposal such as the alunite project. The majority of the information on the proposed action must come from the applicant since there is very little published information available to assist in the identification of reasonable and feasible alternatives. The purpose of an environmental statement is to describe and evaluate environmental impacts that would result from a proposed action. Alternatives to the proposed action must be reasonable, feasible, and provide for accomplishment of the major objective of the proposed action. In the case of the alunite project, the production of alumina, potassium sulfate fertilizer, phosphate fertilizers, and aluminum fluoride are major objectives and should be provided for in any alternative to the proposed action. However, in view of the environmental impacts associated with production of phosphate fertilizer, an alternative of not producing phosphate fertilizer at the alunite plant site has been added to Chapter 8 of the final statement. This alternative will be considered in the decision-making process.

⑦

2030 S. Walnut
Casper, WY 82601
November, 20, 1976

BLM
P.O. Box 729
Cedar City, Utah 84720

Gentlemen:

Ⓐ I am in opposal to the proposed alunite
development in southwestern ~~Utah~~ Utah. The
main reason is that there is no reason to
mine a mountain when we have so much
waste aluminum right now that could be
recycled. Also, the process of converting
alunite to aluminum is terribly energy
consumptive. So it would be much more
environmentally sound to recycle aluminum
that is already here. I also notice that neither
Ⓑ the open pit mine or the rock waste pile will
be reclaimed. That is absurd and totally
~~una~~ unacceptable.

Sincerely,
Ms. Martie Crone

RESPONSE

7. Ms. Martie Crone

A. Recycling of aluminum would conserve energy and would result in less environmental impacts than the proposed action. This alternative is discussed on page 8-4 of the draft statement. However, as is pointed out on page 1-9 of the draft statement, the development of a domestically available source of alumina is considered to be in the national interest by the Director of the Bureau of Mines. Additional recycling could reduce dependence on foreign sources, but it is not realistic to expect recycling to provide the total domestic requirements since 88 percent currently comes from foreign sources.

B. As stated on page 4-8 of the draft statement, the fact that the mine area and waste dump would be composed of solid rock would create a situation where there would be almost no chance of revegetating these areas. The applicant has proposed to backfill the east end of the mine with waste rock to restore the ridge to approximately its original shape (page 1-26). It is also proposed to construct the waste rock dumps with irregular contoured outlines in an effort to blend them into surrounding topography (page 1-28). On page 4-3 of the draft, it is stated that the applicant would be required to grade disturbed areas at the completion of mining operations. Revegetation would depend on natural plant succession and it is expected that natural revegetation would be a long-term situation.

⑧

Nov, 29, 1976

Bureau of Land Management
1579 N Main
Cedar City, Utah 84720

Gentlemen:

In reviewing the proposed Alunite Environmental Impact Statement we would like to make the following comments and observations for your consideration.

We note on page 1-58 that the project will produce about 47 tons of air pollutants daily when control devices are functioning properly. On page 1-60 you state that the proposal will include the watering of tailings ponds to control dust and that these areas will be restored upon abandnent. You also state (4-8) that any such revegation attempts at the mine site will likely fail. In connection with this you state that on the average periods of high winds are likely to occur for 5 days during a month and that during these high winds dust will be carried down the valley(3-39). This condition is estimated to exist for 20 years following the end of the proposed project with an estimated soil loss of 67.5 acre feet (3-38 and 40).

Ⓐ We are critical of these figures. Having been involved in a livestock operation in this valley for many years our experience would lead us to conclude that you are underestimating the effects of the project. We feel that the amount of pollution will be much greater than you estimate and that it will be carried long distances down the valley. Our experience would indicate more than 5 days of high winds on an average month. The tailings piles at Newhouse have been a dust producer for many years and the immediate area there continues to lack vegitation. In addition, the gases from the plant could very likely damage plant life near the processing complex and thereby increase dust problems by creating less stability in the soils nearby. We would suggest that estimates of the potential pollution by revised upward, especially for dust produced from the tailings ponds. We are also concerned with the potential for harm to plants and animals from sulfur and fluoride emmissions. The effects of stack emissions on plant growth and tailings pond dust problems around the Kennecott plants are well known and very serious. In Utah Valley there is a substantial amount of livestock loss due to fluoride emmissions.

Ⓑ On page 1-72 you state that traffic on the railroad access road and the mine access road will be controled by Alumet. On page 3-61 you state that off-road vehicle activity in the area of concern will probably be confined to the numerous roads and trails already available. We would like to know how you intend to accomplish this. It is unrealistic to assume that with such a large influx of people into the area the the publics use of desert roads in this area will be controled. Under the proposed action there will be new roads established everywhere that the best off-road vehicle can go with the associated litter and erosion problems.

Ⓒ In regard to grazing you state that 219 AUM's worth of grazing is located on acrage to be occupied by the project (3-63). For us this figure is unbelivable. If a project of this size can be implemented with this small of an impact we will be greatly surprised. We forsee considerable indirect loss of grazing due to increased travel and public use of off-road vehicles and the establishment of many new trails and roads with the resultant erosion problems that take place. This will cause and additional decrease in grazing capacity which has not been taken into account. We anticipate that there will be a very noticable increase in the incidence of vandalism, cut fences, damaged buildings, water lines, neglence with regard to closing of gates and increased loss of livestock. All of these items will be direct additional expenses to us.

We note (3-81) that the necessary increases in services will likely require additional taxes.

We feel that if the proposed project is implemented that the current population of the area will be trading some of the advantages of living in the area for and improved position in regard to some of the disadvantages. We feel that this trade-off is simply not worth it when we consider that 80 to 90 porcent of the new jobs will be filled by people moving into the area. The project will result in a generally degraded quality of life and many disadvantages associated with a large influx of people and a boom town situation.

On balance and because of the above mentioned reasons we are opposed to the project as it is proposed. From our standpoint we feel that there are few if any advantages and a host of problems associated with it. We are critical of the pollution problem from the mine and plant, the people problems associated with a large population increase in the area, problems associated with the handling of our livestock and the potential increase in taxes.

Ⓓ We feel that the following statements that you have made are inaccurate.
Page 2-35, Wah Wah Springs normally flow slightly over 3 cfs. Page 2-58,
Ⓔ other food for mountain lions also includes sheep. Page 3-63, the Willow
Ⓕ Creek allotment is currently liscensed for 5317 AUM's federal and 533
AUM's state grazing capacity. The Bucket Ranch allotment AUM and acreage
figures would indicate a grazing capacity of just over 25 AUM's per section.
Ⓖ The AUM ratings before the seeding project for this area was higher than
this. We do not feel that there is 7590 acre feet worth of recharge to
Ⓗ the Wah Wah ground water system in a years time.

If the project is implemented we would suggest the following:

Ⓘ 1. That the conveyor system be high enough off the ground to allow the free movement of livestock.

Ⓙ 2. That the pollution by monotered by an independent agency and verified losses compensated.

Ⓚ 3. That a revegation project be implemented to offset the loss of grazing to the livestock operations that will be effected.

Ⓛ 4. That roads be fenced and gates replaced with cattleguards to reduce accidents and the problems of handling livestock.

Ⓜ 5. That the phosphate processing plant be built at the mine site in Idaho to help reduce pollution and people loads on this area.

Ⓝ 6. That the power requirements for the project be met by bringing in power from Utah Power and Light which would reduce the pollution substantially and decrease people problems. In addition, this would provide additional power for Milford and open the possibility of increasing its economic base.

Ⓞ 7. That the plant be located at site #3 in the Esclante Desert where the visual effedts would be less and the project would be nearer established towns. Roads, railroads and utility lines are already established here.

Sincerely,

John W. Wintch
Wintch Livestock Company

RESPONSE

8. Wintch Livestock

A. Since the commenter is a resident of Wah Wah Valley and has observed weather conditions over a considerable length of time, his information on the frequency of high winds is considered to be reliable. The text has been changed to reflect this information. Since the proposed project would have no alternative but to comply with ambient air quality standards for sulfur dioxide, no damage to vegetation or livestock is anticipated. Pollution levels at the Kennecott plant exceed these standards. The potential damage to livestock from fluoride emissions is discussed in the draft statement beginning on page 3-18. It should be noted that the area that would receive potentially harmful levels of fluorine compounds is high terrain which receives very limited use by livestock.

B. There would be no specific action taken by BLM to control off-road vehicle use. However, as stated on page 3-61 of the draft, based on field observations in BLM districts adjacent to large population centers, off-road vehicle use would be primarily confined to the numerous roads and trails already available. In the event significant problems develop, BLM could close the area to off-road vehicle use.

C. There would be some additional surface disturbance from off-road-vehicle use, but in terms of acres and grazing capacity, it is not expected to be significant. The impacts to livestock operators resulting from the large work force at the project site and the increased population are discussed on page 3-64 of the draft statement.

D. This observed spring flow figure has been added to the final statement.

E. The research study cited did not mention sheep as a source of food for mountain lions. However, it is common knowledge that mountain lions occasionally kill domestic livestock.

F. The figure for federal AUMs in the Willow Creek Allotment has been changed in the final statement. Percentage figures for temporary and permanent loss of AUMs in this allotment have also been changed. Grazing capacity for state lands is not included because it would not be affected by the proposed action.

G. The figures in table 3-9 represent the current licensed use in the allotment. In order for the carrying capacity to be changed, the allotment would have to be resurveyed and proper administrative action would have to be taken.

H. The figure for water recharge was estimated in conjunction with a 1974 Department of Natural Resources study of the hydrology of Wah Wah Valley and represents the only published data available.

I. Final design for the conveyor has not been completed, but according to the applicant, the typical conveyor design would allow free movement of livestock.

J. The applicant proposes a monitoring program on page 1-82. This monitoring program would be supervised by the State of Utah. The primary purpose of the monitoring program would be to prevent emission concentrations and cumulative levels from reaching a point where livestock and vegetation losses would occur.

K. A revegetation project would effectively mitigate the loss of grazing capacity that would result from the proposed action. However, federal agencies do not have the authority to commit unappropriated funds. It is certainly possible that a revegetation project could be implemented in the future, but since no legal commitment can be made, the appropriate federal action would be to reduce existing grazing privileges commensurate with loss of vegetation and federal land.

L. The fencing of roads was considered, but because of the effect that fencing would have on the movement and grazing patterns of wildlife and lifestock, it was the opinion of BLM managers that the disadvantages of fencing would be greater than the advantages. At this point, it has not been established who would construct the access highway, but it is reasonable to expect that cattleguards would be a necessary part of the design. A mitigating measure has been added to the Measures Committed by Federal Agencies that would require the installation of cattleguards on all roads and rights-of-way where, in the opinion of the BLM District Manager, the traffic justifies such installation.

M. The alternative of processing phosphate rock at another location has been added to Chapter 8 of the final statement.

N. The alternative of bringing in power from the Utah Power and Light system is evaluated in Chapter 8 of the draft statement. This alternative will be considered in the decision-making process. The purpose of the environmental statement is to provide information on the proposed action and reasonable alternatives.

O. The alternative of locating the processing plant at site number 3 is discussed in Chapter 8 of the draft statement. This alternative site will also be considered in the decision-making process.

9

Bureau of Land Management
District Manager
Cedar City, Utah

Dec. 1 - 1976

Dear Sir,

We the undersigned have read your draft envionmental statement concerning a proposed alunite processing plant in Beaver County and we approve of said plant being built.

This will be a great benefit to our Community which has been gradually going down hill.

It will create needed jobs plus better schools, business etc.

Beaver County is badly in need of more industries if it is going to survive and we believe this is a great opportunity for us.

We support this project and hope you will go after it with haste.

Sincerely yours

Peter S. Martin
Leila Martin
Katherine Allen
Milford, Utah 84751

RESPONSE

9. Peter S. Martin and Others. **No response required.**

⑩

Brouwer Construction
Specializing In New Kitchens And New Homes
BOX 336
TYLER, MINNESOTA

U.S. Dept. of The Interior
Bureau of Land Management
Environmental Project office
BOX 729
Cedar City, Utah 8720

Dear Sir:

my first statement should be that, I am now a board member of Earth Sci. Inc. of Golden Colorado., so my interests are to see the project go ahead, and be a successful mining ~~ventur~~ venture, Environment, being the first concern.

In my business, (contracting) I read three many specification books, never have I seen one as well done, or as through, as this Environmental impa statement, you have covered so many things, that the average individual would not ~~be~~ even be aware of, and I could only appreciate the months, and years of effort, that went into this production. to make it so through, and to the Point, you are leaving nothing to Chance, and in a few cases have possibly gone to far over to the Cautious side, but all things Considered.

An Excellent Report, now Let's go!
Lou Brouwer.

RESPONSE

10. **Brouwer Construction.** No response required.

⑪

TRANSPORTATION COMMISSION

R. LAVAUN COX
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UTAH DEPARTMENT OF TRANSPORTATION
830 North Main
Cedar City, Utah 84720

Director
Blaine J. Kay, P.E.
Assistant Director
C.V. Anderson, P.E.
District Director
Alex E. Mansour, P.E.

December 3, 1976

United States Department of the Interior
Bureau of Land Management
Environmental Project Office
P.O. Box 729
Cedar City, Utah 84720

Gentlemen:

We have reviewed the draft environmental statement prepared on the Alunite Project and offer the following comments:

Ⓐ 1. The name of the Utah State Highway Department was changed to the Utah Department of Transportation on July 1, 1975 by an act of the State Legislature. This should be changed in the final statement.

Ⓑ 2. On pages 3-65 and 3-66 it is indicated that increased maintenance costs and increased accident rates cannot be predicted because of the lack of actual traffic rates. Maintenance costs and accident rates can be predicted using the projected traffic rates given in the draft. Also, the capacity of SR-21 should be analyzed for the projected traffic in both volume and weight. If it will not accomodate the traffic, then an appropriate solution must be developed

Ⓒ 3. The first paragraph on page 5-27 states "Since specific plans to mitigate traffic congestion have not been made, it is not possible to determine unavoidable adverse impacts."

For some time Milford Main Street has been a high priority project with the District Office of the Department of Transportation. Because the proposed Alunite Project would have an impact on improvements, the Milford Project is being deferred until a final decision is reached on the Alunite Project. If the Alunite plant is built, some realignment of the State Highway System may be necessary. Increased traffic generated by this plant may require a larger facility than can be built on the existing

United States Department of the Interior
December 3, 1976
Page 2

Ⓒ **alignment. The Department of Transportation intends to reconstruct SR-257 and SR-21 in Milford, the scope of which will be compatible with development in the area. Because of this, there are "plans to mitigate traffic congestion" if the Alunite plant is built.**

We appreciate the opportunity to review and comment on this document. Please advise us if additional information is needed.

Yours very truly,

Alex E. Mansour

Alex E. Mansour, P.E.
District Five Director

RESPONSE

11. Utah Department of Transportation

A. The appropriate changes have been made in the final statement.

B. In response to this comment, the Utah Department of Transportation has been requested to provide us with estimates of projected increases in maintenance costs and accident rates. The Department was also asked to analyze the capacity of State Road 21. This information has been added to the final statement.

C. As is stated in your comment, specific plans have been made and this sentence has been changed in the final statement to read, "Specific plans have been made to mitigate traffic congestion, but a definite schedule for funding and construction has not been established, and Milford would experience a significant increase in traffic congestion if the planned highway improvements were not completed prior to project implementation."

⑫

Bureau of Land Management: Dec. 2, 1976

I think your EIS on the "Alumet" proposal for alunite mining in the Wah-Wah Mountains is deficient because it does not deal adequately with a couple of impacts that are central to any serious consideration of the project.

Ⓐ The first of these is the impact of more aluminum on our Nation's already overtaxed trash collection systems. When considering a project like this, it is necessary to deal with the project as an entire system. By that I mean not just the logistics of mining, smelting and shipping the alumina, but also WHAT HAPPENS TO THE ALUMINUM AFTER it is mined, smelted, shipped out, and made, for instance, into beer cans. What provision is this company going to make to prevent a proliferation of its product all over the landscape? If the company is going to reimburse federal, state and local governments for increased trash collection costs due to its project, then let us see this agreement IN WRITING! If the company intends to redeem its aluminum at the rate of $1.00 per CAN, let us see THAT in writing, also.

Our governmental agencies are already overburdened by the expenses of trash collection. There is no reason why the taxpayers should have to pick up the tab for this very real "hidden cost" of the 'Alumet' project. We are rapidly reaching the point when fully 10% of our work force will be engaged in trash collection. Some sidewalks of our major cities are cluttered with so many aluminum beer cans that it is impossible to walk without tripping and stumbling over them. The 'Alumet' project will simply add to this cost and waste and the company should be required to repay us for this burden it is so eager to foist upon us. Also, a project of this size can be expected to lower or stabilize the price of aluminum, by making more available. We need the price of aluminum to RISE much higher in order for our Nation's "voluntary" system of recycling to work more efficiently. 'Alumet' should be required to redeem its aluminum for $1.00 per CAN.

Ⓑ Another major consideration left out of the impact statement is this: What impact will the success of this project have on the arrangements of social power in this Nation? Specifically, WHO IS 'Alumet'?? It's a catchy little title (word?), but WHO or WHAT is it? Who is 'Earth Sciences, Inc.'?, 'National Steel Corporation'?, 'Southwire Company'? If there are owners, let them step forward and identify themselves. If there are partners, let them step forward. If there are stockholders, let THEM step forward, every one. If these people are going to profit from this monetarily, I want to know who they are, what are their goals, what do they expect to get out of this, what do they expect to give to the society in return? I want to see a personality profile of every stockholder. I want to be able to examine the level of consciousness and spiritual development of each and every one of them. I want to hear from each of them, in their own words, what they did when they went to the Wah-Wah Mountains, and what they found there.

I want to know what they intend to do with the money they get out of this. Are they going to buy a cadillac? Are they going to take a cruise to Acapulco? Are they going to buy a season ticket to the opera or the local NFL football team? Are they going to take the money and give it to yet another corporation for a similar project? Are they going to give it to the banker who will then give it to another corporation for a similar project? What is going to happen to the money generated by this?

These are all important questions. The impacts of these projects do not stop at the county or even the state line. These projects are intimately related to the social position of the Rich and Powerful in our society, and to the arrangements of power, that is, banks, mutual funds, interlocking boards of directors, etc., and their effect on GOVERNMENT AGENCIES. Every time a big project like this goes through, the power of these people is uplifted and the power of the rest of us is eroded. The profit and cash flow through the financial end of the deal in projects like these has a far greater impact on "the Environment", in the larger sense, than any of the items you list in your EIS, because this is what generates these projects in the first place ---- GREED! If there weren't alot of money to be made on this, the people who are pushing it would remain sitting on their asses.

There is no reason in the world why Public Land (NOT 'National Resource Land --- PUBLIC LAND!) must be sacrificed, sold off, or given to these people who are going to profit by it, and take the money home with them!! This is land held IN COMMON, not for private gain. IF the Nation needed aluminum, it would develop this resource itself --- for its own people, not for these private opportunists. Since the people do not need more aluminum, as witnessed by their eagerness to throw it out the window, then leave it in the ground, the public ground, where it belongs! If we need it in the year 2200, we can always get our government to take it out for us. The private vultures should stay in Salt Lake City, Phoenix, Wall Street, wherever they came from.

Please see that this gets into the "Written Comments" section of the EIS, and please deal with these impacts in your final version. I would appreciate learning places, times and dates of public hearings on this matter when/if they are scheduled.

Respectfully Yours,

Steve Tabor
Steve Tabor
Box 339
Moab, Utah 84532

RESPONSE

12. Steve Tabor

A. There is no apparent relationship between the proposed action and an increase in the amount of aluminum products in the United States. As stated on page 1-9 of the draft statement, the primary effect of proposed action would be to provide a domestic source of alumina to provide aluminum for established uses. If such aluminum was not produced from domestic sources, it would be imported from foreign sources.

B. This comment raises philosophic and social issues which are beyond the scope of this environmental assessment.

⑬

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
4012 Federal Building, Salt Lake City, UT 84138

December 3. 1976

Mr. Morgan Jensen
District Manager
Bureau of Land Management
P. O. Box 729
Cedar City, UT 84720

Dear Mr. Jensen:

We appreciate the opportunity to review the Draft Environmental Impact Statement for the proposed Alunite Project in Beaver County. The report is well organized and well written.

We offer the following suggestions to assist you in preparing the Final EIS:

Ⓐ 1. Tailings ponds could be fenced to exclude wildlife, livestock, and wild horses from these areas.

Ⓑ 2. The Universal Soil Loss Equation (USLE) could be used to determine soil loss from disturbed areas. Rates are given for natural conditions but not for disturbed areas.

Ⓒ 3. Stockpiling topsoil with native plants and seeds in it, then spreading back on disturbed areas will allow more rapid revegetation.

Ⓓ 4. Mitigation of the loss of grazing could be accomplished by applying conservation land treatment measures to improve range condition on adjacent areas.

Ⓔ 5. Page 5-15 - A 1% loss of wildlife habitat may not be significant unless it is an area of good quality habitat. State the quality of the habitat being lost.

Ⓕ 6. The discussions regarding wildlife seems to be keyed to hunting and hunter success. Nonconsumptive users of wildlife are more concerned about population numbers for aesthetics.

Attached is a sample of comments provided by our field people.

Sincerely,

George D. McMillan
George D. McMillan
State Conservationist

Attachment

UNITED STATES DEPARTM… ICULTURE
SOIL CONSERVATION SERVICE
Richfield, Utah 84701

SUBJECT EVT - Alunite EIS, Beaver County DATE: No

TO Harold Brown, AC

The following are my comments on the subject EIS by the BLM. I did not take time to make a detailed study of the draft.

IMPACTS

Ⓖ 1. Pages 3-1 and 3-2 state the removal of vegetation will have a direct impact on wildlife and recreation. It should be added that it will also have an adverse impact on livestock (sheep and cattle), the principal economic income from the site for the past 100 or more years.

Ⓗ 2. Cloudburst flooding would probably damage roads, plant site or other developments unless flood proofing or other control measures are specified. Floods and sedimentation are not directly referred to in the draft EIS, but impacts would be localized.

Ⓘ 3. Page 3-43. The fourth sentence states that Rabbitbrush has no forage value for livestock or wildlife. This statement is not entirely correct. C. viscidiflorus is rated fair for sheep and deer.

Ⓙ 4. Recreation: Pages 3-56, 3-57. Impacts on fisheries would extend beyond Beaver and Iron Counties and especially into Sevier, Garfield, Wayne and Piute Counties. (Fishermen from Nevada, Arizona and California come to fish in southern Utah fisheries).

Ⓚ 5. Page 3-59. Increased hunting and fishing pressures will no doubt create increased trespassing, vandalism to fences, gates, livestock and other rural and recreational property and facilities.

Ⓛ 6. Page 3-65. Railroads and roads, if fenced, will have some adverse impacts on movement of big game and livestock and will sever parts of two grazing allotments.

Ⓜ 7. Socio-Economic: The influx of 1000-1800 employees or families will surely stimulate increased cost of rentals, homes and land values, especiall in and near the communities of Milford, Minersville and probably Beaver.

Ⓝ 8. MITIGATION. Page 4-10. The project wells, pumps and pipelines should be considered as potential facilities for insuring the revetation of disturb areas with portable sprinkler systems.

9. UNAVOIDABLE ADVERSE. The loss to livestock grazing of 219 AUMs on 2715 acres of disturbed lands for at least the 25 years expected life (O) of the project. Livestock grazing losses are more direct and important than wildlife as the livestock is confined to the specific allotments while wildlife is free to move out of the impact area.

10. ALTERNATIVES. Mitigating Measures: Page 8-48. Water ~~s~~chould be piped (P) from same source as proposed for plant location sites 1 and 2. Thus aleviating the need to purchase from agricultural users.

There is no doubt the building of the plant and development of the mineral resources will have a considerable beneficial economic impact on Beaver (Q) County. The relative isoltion of the proposed plant location relegates the major adverse enciromental impacts on natural resources to a relatively small localized area but some social and recreational impacts will extend into neighboring counties not indicated in the report.

Carl

Carl W. Wilker
Resource Conservationist

RESPONSE

13. Soil Conservation Service

A. As stated on page 4-3 of the draft statement, the tailings ponds would be fenced.

B. The universal Soil Loss Equation would certainly provide a much better estimate of soil loss than the method used in the draft statement. However, data on rainfall characteristics, soil erodibility and slope characteristics are not available and it would require considerable time and effort to acquire this data. The potential impacts resulting from soil loss would not justify the effort required.

C. As stated on page 4-2 of the draft statement, the BLM would require stockpiling of topsoil at material sites. The applicant has committed to stockpiling of topsoil (page 4-6) during construction of road cuts and fills.

D. See response to comment in letter no. 8 from Wintch Livestock Company.

E. The quality of the wildlife habitat that would be lost is discussed on page 2-61 of the draft statement.

F. The section on wildlife and wild horses beginning on page 2-57 of the draft statement includes an estimate on populations for each animal species of major interest to man. The section beginning on page 3-44 dealing with impacts to wildlife and wild horses attempts to identify impacts to the populations of these animals. In some cases, the discussions are general in nature because of the limited information that is available.

G. Vegetation removal would also directly impact livestock and is discussed in the land use section on page 3-62 of the darft statement.

H. The localized impacts associated with cloudburst flooding and sedimentation are discussed in the hydrology section on page 3-36 of the draft statement. The applicant has proposed to install ditches, culverts, and other drainage devices necessary to protect roads (page 1-7).

I. The final statement has been changed to reflect this information. The word "no" has been changed to "limited".

J. Impacts on fisheries because of the population increase would occur beyond Beaver and Iron Counties. However, the interdisciplinary team did not think this increase in fishing pressure from new residents would be significant. As you point out, southern Utah fisheries receive considerable fishing pressure from residents of large population centers and the increase in fishing pressure from 4,500 new residents is not expected to be significant except on local fisheries such as Minersville Reservoir.

K. The impacts you list that would occur with increased hunting and fishing pressures are discussed on page 3-64 of the draft statement.

L. The Bureau of Land Management agrees with this evaluation of the situation and it is proposed in Chapter 1 that railroads and roads not be fenced.

M. The increased value of housing that would occur with the population increase is noted on page 3-84 of the draft statement.

N. The applicant has committed to a program of revegetation including vegetation on disturbed surfaces (page 4-6) and in the event it is determined that irrigation is necessary to ensure revegetation of problem areas, BLM or the State of Utah could require such action. However, as stated on page 4-10 of the draft statement, the significance of impacts to soils and vegetation do not appear to justify costly irrigation systems.

O. The relative value of livestock and wildlife losses is an individual value judgment and cannot be considered in the statement. However, as you point out, livestock grazing is confined to allotments and loss of grazing privileges is a direct loss to the rancher. In this area, it appears that adequate habitat is present to accommodate displaced wildlife. This information is also in the land use and wildlife sections of the draft statement.

P. This suggested alternative water source has been added to the assessment of alternative plant site 3 in the final statement.

Q. The socioeconomic impacts of the proposed project on Cedar City and Iron County are assessed in Chapter 3 of the draft statement. The significance of regional recreational impacts was discussed in comment "J" above. Since you do not indicate specific areas where the impact analysis for neighboring counties was deficient, it is not possible for us to respond to this comment. However, it should be noted that the interdisciplinary team identified and assessed all the impacts associated with the proposed action. A large number of regional impacts were identified, but a majority of these impacts did not have enough significance to be included in the environmental statement.

⑭

12/4/76

Dear Sir,

I'd like to say something about one part of the proposed Earth Sciences alunite project which is reviewed in the draft environmental statement you sent me. That part is the phosphate rock which they expect to ship to the project from Idaho.

Ⓐ

The draft environmental statement, Development of Phosphate Resources in Southeastern Idaho, covered 2 mining proposals that Earth Sciences has a hand in. The first is an underground phosphate mine west of Bloomington, Idaho, which is proposed to begin operations as soon as possible; Earth Sciences is the only company involved. The second is a proposal made by "the Alumet Group, an association of Earth Sciences, Inc., National Steel Corporation, and South Wire Company" for a surface phosphate mine near Diamond Creek, east-northeast of Soda Springs, Idaho. Operations there are scheduled to begin soon too. (Alumet also proposes 2 other mines, but they are not slated to operate before 2000.) According to the statement, it is the ore from the Diamond Creek mine that will go to this alunite operation in Utah. Phosphate from the underground mine, the statement says, will apparently be sold.

I don't know if the phosphate rock from Idaho is integral to the proposed alunite project, but it must be pointed out that these phosphate mines have not been approved, and there is no guarantee that they will be — particularly the Diamond Creek mine. The phosphate DES analyzes 15 different proposed mines, and there is fair unanimity that the Diamond Creek mine will be the worst of the lot. Many of the proposed mines are near existing mines; the Diamond Creek mine is in a pristine area. The mine will have unavoidable adverse effect on Diamond Creek water quality, and on Blackfoot River water quality, which Diamond Creek combines with Lanes Creek to form. Both Diamond Creek and Blackfoot River currently possess outstanding fisheries which the mine will degrade. The mine will displace "as many as 100 deer, 50 elk, and 10 to 15 moose." Varying numbers of grouse, beavers, sandhill cranes, ducks, canada geese, and other geese will also be displaced. Potential whooping crane habitat will be destroyed north of the proposed mine, at the Grays Lake National Wildlife Refuge, an attempt to introduce a new breeding population of this endangered bird to this part of Idaho is underway. And the mine will ruin a beautiful spot.

All in all its a pretty stupid place to put a phosphate mine, and there will be a lot of people and a few state agencies working to torpedo it. We of course hope to succeed. So don't count on the ore from the Diamond Creek mine; God willing, the phosphate will remain supportive of earth and animals, instead of America's manic consumption. Thank you.

Pat Ford
800 Saturn Avenue
Idaho Falls Idaho 83401

RESPONSE

14. Pat Ford

A. The interrelationships of the alunite project and the proposed phosphate mine in Idaho are discussed on page 1-97 of the draft statement. As stated in the comment letter, this phosphate proposal is being considered in another environmental statement. It is not known whether phosphate rock from the proposed mine in Idaho is integral to the alunite development, but it is assumed that phosphate rock could be obtained from other sources. However, since the applicant proposes to use phosphate rock from Idaho for the alunite project, the chemical analysis and character of this rock was used in identifying the potential air and water quality impacts from fluorine compounds, cadmium, and radioactivity. Emissions from the phosphate processing are summarized in tables 1-6, 1-7, and 1-8 in the draft statement. Environmental impacts are evaluated in the air quality and hydrology sections of Chapter 3.

(15)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

DEC 2 1976

District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Dear Sir:

Enclosed are this Department's comments on the draft environmental impact statement concerning the Alunite project in Beaver County, Utah.

Thank you for the opportunity to review the document.

Sincerely,

Charles Custard

Charles Custard
Director
Office of Environmental Affairs

Enclosure

MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

TO : Director
Office of Environmental Affairs/DHEW

DATE: November 2, 1976

FROM : Principal Environmental Officer/H

SUBJECT: DEIS:DoI/BLM Alunite, Beaver County, Utah #789

Pursuant to review of the subject DEIS, we judge it to be incomplete as related to the following public health and safety impacts.

(A) **1. We fail to find any mention of adequate occupational health and safety precautions needed to protect on-site employees against the expected levels of fluorides, SO_x, alumina dust, etc.**

(B) **2. We note that the area just west of the range of the mountains has a number of existing mines and power plants as well as planning for same. This area has been noted to have rather high episodes of air pollutants especially during periods of air stagnation which are not uncommon. While the DEIS does address the anticipated level of pollution resulting from this particular operation, it would be impossible for us to comment on the health and safety resultants without some insight and data as to the total pollutant levels that would result during weather inversions from all the plants and operations in this area, such data should be supplied, especially that for fluorides and SO_x.**

(C) 3. It is noted that the anticipated increase in population will exacerbate a pre-existing shortage of medical services available to this area, the only comment being that it will require local residents to travel further for medical care. The communities involved should be working with the HEW Regional Office to investigate alternative possibilities of supplementing their present level of medical care.

(D) **4. It is also noted that short falls of water supply and sewage disposal facilities are anticipated and that ameliorating actions are planned. We would like some reassurance that the actions are past the planning stage and that active construction to supplement existing supplies and facilities are underway.**

(E) 5. Rangeland and vegetation in proximity to the plant will be contaminated by air pollutants from the mining operation with subsequent uptake by range animals into the food chain. A clear assessment of potential impact on health and safety should be available.

Alunite, Beaver County, Utah 2

(F) **The Department of Interior DEIS has been issued with no apparent cross reference and assessment of cumulative impact with other possible Federal projects in the ecological system.**

Boris J. Osheroff
Boris J. Osheroff

Control Slip #789

RESPONSE

15. Department of Health, Education, and Welfare

A. Legislation requiring strict compliance with comprehensive occupational health and safety standards has been adopted by both the Federal Government and the State of Utah. It can only be assumed that these laws would be enforced and since the applicant has no option but to comply with the regulations, there would be no purpose in discussing these regulations in an environmental statement.

B. There are a number of small, inactive mines in the vicinity o. the proposed project, but we are not aware of any power plants or planned power plants. The Nevada Power Company's 330 MW Reid-Gardner Plant is located about 150 miles southwest of the project site and a 500 MW plant is proposed for the Warner Valley area which is about 100 miles south of the project site. The applicant measured existing pollution levels at the proposed plant site for a year, and these background levels are included in the projected pollution concentrations reported in the air quality section of Chapter 3.

C. A copy of your letter has been forwarded to the Beaver County Planning and Development Council. This group is coordinating efforts to mitigate impacts, and includes representatives from local communities.

D. Some improvements which would be necessary to meet the needs of the existing population have been completed. The Bureau of Land Management has limited authority to enforce socioeconomic mitigating measures, so plans by state and local governments to mitigate impacts have only been restated. It is assumed that these plans would be carried out if the proposed action takes place, but the communities involved have no plans to commit funds or initiate improvements until the certainty of the project is known.

E. As you point out, pollutants could enter the food chain and would have potential effects on soils, plants, and animals. This situation is discussed on page 6-4 of the draft statement. However, as stated in the air quality section of Chapter 3, Class II standards would be met except in a small area of high terrain which receives no use by domestic livestock and very little wildlife use. The Class II levels set for sulfur dioxide and particulate concentrations preclude any adverse impacts to vegetation and animals. Class III standards which allow higher pollution levels also preclude adverse impacts to vegetation, animals, and man. Since even the small area of high terrain would meet Class II standards a majority of the time, no significant uptake of sulfur compounds and particulates is expected to result from the proposed project. The situation with fluoride compounds is not so easy to evaluate and is discussed in detail beginning on page 3-18 of the draft statement. It should be noted in the final statement that the applicant has moved the processing plant site further from the high terrain which would result in lower pollution concentrations and would ensure compliance with Class III standards on the adjacent high terrain.

F. The assessment of cumulative impacts was thoroughly evaluated by an interagency group and by the interdisciplinary team which prepared this statement. Interrelationships with other projects are discussed on page 1-94 of the draft statement.

16

Congreſs of the United States
House of Representatives

ALLAN T. HOWE, 2ND DISTRICT, UTAH

COMMITTEES:
INTERIOR AND INSULAR AFFAIRS
PUBLIC WORKS AND TRANSPORTATION

WASHINGTON OFFICE:
[illegible] Longworth Building
Washington, D.C. 20515
(202) 225-3011

DISTRICT OFFICES:
2311 Federal Building
125 South State Street
Salt Lake City, Utah 84111
(801) 524-5383

82 North 100 East
The Federal Building
Cedar City, Utah 84720
(801) 586-[illegible]

December 6, 1976

Mr. Morgan Jensen
District Manager
Bureau of Land Management
P. O. Box 729
Cedar City, Utah 84720

Dear Mr. Jensen:

I have reviewed the Draft Environmental Impact Statement for the proposed Alunite Project in Beaver County, Utah and found the description of the proposed action, possible alternatives, and probable environmental impacts sufficient for the purposes of this document as required under the National Environmental Policy Act of 1969.

It is my understanding that the Alument Company proposes to lease national resource lands under the Mineral Leasing Act to mine and process approximately 4 million tons per year of alunite ore. The major components of this operation would include an open pit alunite mine, a waste rock pile, a processing plant complex including a 750 megawatt power plant, tailings pond, a 20 mile railroad spur, a 10 mile access highway, a water well field, and other support components which would result in environmental impacts effecting the quality of air soil condition, vegetation, wildlife habitat, aesthetic values, and land productivity. In addition, certain cultural and socio-economic impacts would occur affecting the communities of Milford, Minersville, Beaver, and Cedar City.

I am pleased that the draft EIS treats a broad range of impacts and discusses mitigating measures and alternatives. With some additions and further discussion the final EIS should reflect a thorough analysis of environmental impacts and provide both the project developers and public officials with a comprehensive document sufficient for planning sound environmental development.

It is my hope that federal consideration of the necessary federal actions, including the granting of preference right leases for potassium; the granting of rights-of-way for roads, utilities, and railroads; and the exchange of national resource lands with the State of Utah will continue expeditiously and include a full review of the recommendations of the environmental impact statement. The Alunite Project will provide an outstanding contribution to the economy of Southwestern Utah, including the addition of 1,000 annual jobs, and it should be planned, constructed, and maintained in a manner that will maximize the trade-off between environmental protection and economic gain.

Sincerely,

Allan T. Howe

Allan T. Howe
MEMBER OF CONGRESS

ATH:mcl

16. **Congressman Allan T. Howe.** **No response required.**

17

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DEC 7 1976

STATEMENT ON THE ALUNITE DRAFT
ENVIRONMENTAL IMPACT STATEMENT
PREPARED BY BUREAU OF LAND MANAGEMENT
UNITED STATES DEPARTMENT OF THE INTERIOR

Submitted by Dr. Kelly K. Matthews
Vice President & Economist
First Security Company

The following is a brief commentary on the economics associated with the development of the alunite deposits in the area west of Milford, Utah. These comments relate specifically to the material identified, described and analyzed in the Draft Environmental Impact Statement, as well as the general desirability of the project. It is intended that these comments will be reviewed and considered in the preparation of the final impact statement.

Over the past several years, the economy of Beaver County, Utah has been generally stable, experiencing little, if any, real growth. The most recent population estimates are still far below the 1960 census population total as many young people have been forced to leave the area in search of better employment opportunities. Non-agricultural payroll employment has remained essentially unchanged since 1971 and the 1975 total was actually below the previous year. Income levels and retail sales in the county, influenced by the rate of inflation, have increased in recent years, but the rate of growth has frequently been below the state average. These and other economic trends are identified in Section 2 of the Draft Environmental Impact Statement.

The economic impact resulting from the construction of the proposed alunite project on the stable-to-declining economy in Beaver County would be positive and beneficial. In Section 3 of the Draft Environmental Impact Statement beginning on page 67, it is noted that a population increase of 4,500 new persons would be expected in the surrounding area when a full operating level of the alunite project is achieved. Employment at the proposed project is estimated to reach 1,200 during the construction phase and would be 1,000 during the operation phase. The impact on income resulting from the construction of this project, as estimated by the Bureau of Land Management, would generate a 40 percent increase in personal income for Beaver and Iron Counties combined.

Of most importance is the sentence on page 376 relating to this income growth which states "The increased income could substantially increase the standard of living." The growth in economic opportunity in terms of employment and income is certainly associated with an improved standard of living.

There is little doubt that the mode of living currently prevailing in the Milford-Beaver County area will be altered by the construction of the proposed alunite project. With the adherence to the environmental regulations thoroughly described in the Environmental Impact Statement, First Security Corporation believes that the economic change resulting from the construction and operation of this project would have a positive impact on the standard of living and the quality of life in Milford County.

The "unavoidable adverse economic impacts" on the towns in Beaver County identified in Section 5, page 26 need not necessarily be adverse and very likely can be avoided. The Draft Environmental Impact Statement suggests that "increased demands resulting from the new population would lead to housing shortages, lack of goods and services and a lower quality of life." Additionally, the statement suggests that "a lack of people to fill new non-basic jobs to provide goods and services would create adverse impacts." The Impact Study also states that increased housing demands in the Milford-Minersville area would create a major unavoidable adverse impact due to the lack of available housing.

Ⓐ

Each of these three areas identified by the Environmental Impact Statement as resulting in an unavoidable, adverse impact need not necessarily develop. In a rural area with a stable economy, such as Beaver County, there is certainly no rational way that housing could be available, ready and waiting for the influx of population prior to the time the project has been approved and under construction. With proper planning, however, mobile home parks and other housing facilities can be provided to meet the needs of the population without incurring a detrimental impact. The suggestion that several years lag time would be required before the production of goods and services is sufficient to facilitate the increased population is probably not accurate. The influx of construction workers and miners into various communities in eastern Utah in 1976 approaches in magnitude the number of employees associated with the alunite project. While a strain on certain services has been incurred, there has been no serious detrimental impact. If plans are carefully laid and sufficient information is made available to municipal governments and private industry, there is no reason to believe that a rapid influx of population would result in an unavoidable, adverse economic impact in the Milford-Beaver County area. There is every reason to believe that the improved economic opportunities associated with the project in terms of employment, income, retail sales and the demand for goods and services would generate a higher standard of living and improved quality of life for the existing, as well as the new, inhabitants of the area.

On this basis then, with the knowledge that appropriate environmental regulations will be met, First Security Corporation supports the construction of the Alunite Project.

RESPONSE

17. First Security Company

A. The mitigating measures in Chapter 4 consist of state and local plans to alleviate adverse impacts. For the most part, only preliminary planning has been or will be done prior to knowledge of the project's certainty. To say that no adverse impacts would occur assumes that all planned mitigating measures would be carried out in an acceptable manner within the appropriate time frame. If this occurred, then few adverse impacts would result. However, it is not known with what success these measures would be carried out. In addition, since the publication of the draft statement, some improvements have been made and additional mitigating measures have been planned. Because of this, some of the wording in Chapter 5 has been changed to say that certain impacts "could" occur rather than "would" occur.

18

United States Department of the Interior
MINING ENFORCEMENT AND SAFETY ADMINISTRATION (MESA)

ROCKY MOUNTAIN DISTRICT
Metal and Nonmetal Mine
Health and Safety

2900 South Main St.
Salt Lake City, UT 84115

December 6, 1976

HLS 5-5-2

Mr. J. Kent Gilles, Acting District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, UT 84720

Dear Mr. Gilles:

This is in reply to your request for a review of the draft environmental statement on the Alunite project in Beaver County, Utah.

The Mining Enforcement and Safety Administration, Department of the Interior, has no particular comments concerning the impact statement. All phases appear well covered and detailed in this statement. Our jurisdiction applies under Public Law 89-577 which becomes applicable when actual mining preparations are started.

I will plan to have someone from this office contact you or your representative some time in the early part of 1977.

Sincerely yours,

H G Plimpton
H. G. Plimpton
Subdistrict Manager

RESPONSE

18. Mining Enforcement and Safety Administration. **No response required.**

19

The Wilderness Society

4490 South 1300 East, Salt Lake City, Utah 84117 (801) 268-4533

Cedar City Utah RECD.

Section	Action	Info
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DEC 7 [illegible]

December 3, 1976

Mr. Morgan Jensen
Bureau of Land Management
1579 North Main Street
Cedar City, Utah 84720

Dear Mr. Jensen:

I would like to make a couple of short comments concerning the Alunite Draft Environmental Impact Statement. I was not able to attend the public hearing in Salt Lake City, Utah on December 1, 1976. However, I would like to submit these comments for the official hearing record.

(A) First, the Draft EIS is generally a well developed proposal. However, a number of concerns have been raised concerning the project's impact upon the Class II ambient air quality standards. Certainly, the modeling projects with their wide disparity in emission concentrations tend to indicate that the project will not be able to meet Class II standards. Further evaluation of these modeling trends and further emphasis upon emission removal, including the flourides is necessary prior to issuance of right-of-way permits and federal leases.

(B) Second, the Draft EIS only offers a cursory glimpse at wildlife impacts. The assumptions made are that alternative habitat exists and is available once the project site and southern end of Wah Wah Valley are developed. That assumption needs further validity within the EIS, particularly given the possibility that this test project will be extended beyond its 25 year life to the proposed 75-100 year life span. Given that assumption and the obvious growth of western Utah and eastern Nevada over the next one-hundred years, what habitat will be available for species such as the mountain lion or antelope or peregrine falcon on Natural Resource lands? An obvious emission from the planning document. It is an emission whether considered on the one-hundred year scale or the twenty-five year scale since further energy development is a possibility within both time frames.

(C) And third, our concerns obviously dictate an interest in the nearby Wah Wah Mountains. Portions of these mountains have been identified as a potential Natural Area. Will the activities associated with the Alunite project preclude the Wah Wah Mountains from this classification? Particularly given Section 603 (a and c) of PL 94-579 which authorizes the BLM to study withn a fifteen year period all roadless areas having wilderness characteristics and protect those areas to "prevent unnecessary or undue degradation of the lands and their resources or to afford environmental protection."

The Wilderness Society certainly opposes the reduction of the wilderness/natural values of the roadless tracts of land until the mandates of Section 603 (a), (b) and (c) are met.

"*In Wildness is the Preservation of the World.*" *Thoreau*

Mr. Morgan Jensen
December 3, 1976
page 2

I look forward to hearing from you concerning these matters as soon as possible. Thanks very much.

Sincerely,

Dick Carter

Dick Carter
Utah Regional Representative

RESPONSE

19. The Wilderness Society

A. As stated in the draft statement, there is a possibility that Class II, and in some cases Class III standards, could not be met on a small area of high terrain adjacent to the plant. The applicant has proposed to install the best available pollution control equipment and additional emission removal is not possible. For this reason, the proposed plant site has been moved further from the high terrain in the final statement. This would ensure that Class III standards would be met. Because of the problems of high terrain, the area will have to be redesignated as Class III if the proposed project is to be authorized by the State or EPA under the Prevention of Significant Deterioration regulations.

B. There is very little data to predict specific impacts to wildlife from the proposed project. The assumption that alternative habitat exists and would be available was made after consultation with BLM wildlife specialists and Division of Wildlife Resources game managers. As mentioned in Chapter 6 of the draft statement, the proposed project, if successful, could be expected to have a 75 to 100 year life span. However, it should be noted that any expansion of the project size or extension in the life of the project would be subject to additional environmental analysis of the cumulative impact on all resources including wildlife. At the present time, there is no energy development planned for the area of concern for the alunite project. Since the proposed project would come very close to the limits allowed for deterioration of air quality in the area, there would be very little latitude for further deterioration of air quality by additional mineral development.

C. The interdisciplinary team that prepared the draft statement evaluated this situation and it was their opinion that the proposed project would not have a significant effect on the potential natural area. The proposed natural area lies north of Highway 21 and is approximately 15 miles from the project site. Access into the area would not be changed, and as stated on page 3-24 of the draft statement, Class I air standards would be met within 10 miles of the plant site. This area would continue to be available for study and designation as a natural area.

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FEDERAL ENERGY ADMINISTRATION
REGION VIII
1075 South Yukon
P.O. Box 26247, Belmar Branch
Lakewood, Colorado 80226

December 3, 1976

District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Gentlemen:

The Federal Energy Administration (FEA) Regional Office is responding to your draft environmental impact statement (DES) on the Alunite Project received by this office on November 5, 1976. We submit the following comments regarding the DES:

1. The magnitude of the Alunite Project is massive. Consequently, environmental considerations, energy conservation, and socioeconomic considerations must be carefully planned for prior to the construction of the project.

(A) 2. BLM should be made aware that the Alunite operation by Federal law constitutes a major fuel burning installation (MFBI). An MFBI is an installation other than a powerplant that has or is a fossil fuel fired boiler, burner, or other combustor of fuel, or any combination thereof at a single site that has a design firing rate of 100 million BTU's per hour or greater. Consequently, FEA requires MFBI's to submit a form FEA C-603-S-0. The authority for this is found in Section 2 (a and b) of the Energy Supply and Environmental Coordination Act (ESECA) of 1974. (P.L. 93-319)

Inasmuch as the Alunite operation falls within this category of an MFBI as spelled out under ESECA, it is requested that you contact the following individual to be in compliance with the Act:

Mr. James S. Rubin
Director, Office of Fuel Utilization
Office of Energy Resources Development
Federal Energy Administration
Room 6117, Federal Building
12th and Pennsylvania Avenue, N.W.
Washington, D.C. 20461
(FTS 8-566-7941)

3. We feel a detailed energy analysis input/output section is needed for this project judging by the magnitude of energy resources being expended in producing the products. The fossil fuel expenditures

alone are extensive and would amount to at least 26 million gallons per year. Coal usage will amount to over 1.15 million tons per year. The mill will require 2-1/2 energy intensive trains per day to haul supplies and products, not even counting the energy needed to produce needed raw materials such as sodium hydroxide, potassium hydroxide, sulfur, ammonia, etc.

(B) In summary, it is felt that because of the project's magnitude, extensive fossil fuel utilization, and longevity (project's expected life may exceed known world reserves of petroleum), that a detailed energy analysis is essential. This statement could be used for conservation planning even prior to construction.

There are several excellent references on fossil fuel energy input/output studies:

"Net Energy Analysis: An Energy Balance Study of Fossil Fuel Resources," Colorado Energy Research Institute, P.O. Box 366, Golden, Colorado 80410, April 1976.

"Comparative Risk-Cost-Benefit Study of Alternative Sources of Electrical Energy," U.S.-AEC, December 1974.

4. (C) According to the DES, the Midford area has already overdeveloped its ground water supply and, consequently, has been lowering the water table. With the projected withdrawal rates at the mill site, it is questioned whether the Midford ground water supply in some way may be affected even though it is understood that Midford and the mill site are in different drainages. (D) It is also questioned whether geothermal resources will be affected by the cumulative effect of Midford, Alunite, and future geothermal power water withdrawals. What is the source of the geothermal feed water? Is it a portion of the ground water system around Midford? (E) What provisions are being enacted to assure that the plant site and the town of Midford will have adequate water if ground water supplies prove inadequate? It was stated on pages 3-30 of the DES that the anticipated expansion in Midford caused by mine and labor demands would increase depletions of the ground water supply by 20 years. How were the ground water reserves estimated? How firm is their accuracy?

5. (F) What type of material will be used in lining the waste ponds to reduce infiltration into the subsurface water courses?

6. (G) The DES mentions on pages 2-15 about using atmospheric mixing depths from four different areas, then interpolating the results to obtain a general idea of the mixing depths in the area of the mine. We question the validity of using sites so distant from the proposed mill and mine for the interpolations. The only one even remotely close is Las Vegas. It is felt that because of the microclimatic differences in these sites that a more valid method be used to obtain this data.

(H) **7.** The DES states on pages 3-27 that Wah Wah Valley is recharged on the order of 8,500 acre-feet per year and that the Alunite Project will draw out about 8,000 acre-feet. What studies substantiate the amount of recharge to the valley? Has a series of test wells been drilled and studied to substantiate this recharge figure?

Socioeconomic Aspects

(I) **1.** BLM should be aware of the current study plans by the State of Utah and reference made in the DES to reflect the results. The State of Utah is supporting an effort of the Five County Association of Governments to prepare plans to mitigate adverse effects of Alunite development. The County Planning and Development Committee has analyzed the impact of the Alunite Project. The contact man is Jed Kee, Utah Planning Coordinator.

2. The communities in close proximity to the Alunite development will suffer all problems involved with the "Boom Town Syndrome." Consequently, it is hoped that community, county, state, and company officials will coordinate their efforts, for the impending impact of 4,500 people on this relatively unpopulated area could be substantial.

(J) **3.** Are Beaver County and Iron County working on land use plans to channel growth in desirable directions? Are the towns of Milford, Minerville, Beaver, Cedar City planning in the same direction?

Thank you for the opportunity to comment on this DES. It is hoped that our comments will be beneficial to the planning.

Sincerely,

Dudley E. Faver

Dudley E. Faver
Regional Administrator

20. Federal Energy Administration

A. The applicant has contacted FEA in response to this comment and this requirement has been added to the list of necessary federal actions in the final statement.

B. This comment has been discussed with representatives from FEA and an energy analysis has been added to the energy resources section of Chapter 7 in the final statement.

C. The Milford area and Wah Wah Valley ground water reservoirs have been investigated by the State of Utah and the U.S. Geological Survey. According to their data which is presented in Chapter 2 of the draft statement, the ground water in the Milford area is not expected to be affected by withdrawals in Wah Wah Valley.

D. Geothermal wells in the Milford area are from 6,000 to 10,000 feet deep. The wells supplying irrigation and culinary water are from 100 to 300 feet deep and in the opinion of state and federal geologists working with the geothermal developments, there is no relationship between the two water sources.

E. Ground water is the only realistic source of water for both Milford and the project site. As stated on pages 2-35 and 2-38 of the draft statement, these ground water basins have been investigated by State of Utah and U.S. Geological Survey studies, and based on this research and pumping history in the Milford area, adequate water is available. The fact that culinary water requirements for the population increase in the Milford area would preclude existing agricultural water use is pointed out in the final statement.

F. The applicant has proposed to compact the bottom of the tailings ponds to reduce permeability of the underlying material (page 1-59). The potential impacts of seepage from the tailings ponds into the ground water reservoir are discussed on page 3-31 of the draft statement.

G. The interpolation method of determining mixing depths was the only method available. No measurements were made on the site, and routine observations are only available for widely scattered locations. The mixing depths obtained were only meant to depict general conditions and were not used in modeling calculations without using cautious judgment as to most applicable local conditions.

H. The study that provided this estimated water recharge figure is cited previously in the draft statement on page 2-36. The applicant has drilled a series of test wells to determine the extent and quality of the ground water, but outside of the hydrologic study of Wah Wah Valley cited on page 2-36, there has been no attempt to verify this recharge figure.

I. The BLM is aware of the State of Utah plans and has been working closely with the State and the Five County Association of Governments. A significant portion of the information on socioeconomic impacts came from this coordination with the Beaver County Planning and Development Council. The mitigating measures commited by state and local agencies beginning on page 4-4 of the draft were submitted by this council. Appendix D of the draft statement contains letters from the State Planning Coordinator's Office and the Beaver County Planning and Development Council and includes detailed responses to BLM's request for mitigating measures for potential socioeconomic impacts.

J. The existing land use planning situation is described on page 2-14 of the draft statement. Impacts to land use planning are discussed on page 3-89.

㉑

BEAVER COUNTY
State of Utah

FRED B. HARRIS
CHAIRMAN
THURMAN F. EYRE
COUNTY COMMISSIONER
STANLEY C. ROBERTS
COUNTY COMMISSIONER
NICHOLAS R. DOTSON
CLERK AND AUDITOR

RONDO T. FARRER, TREASURER
ROBERT BRUCE BROWN, RECORDER
MAX LIMB, ASSESSOR
DALE NELSON, SHERIFF
JOHN O. CHRISTIANSEN, ATTORNEY

Beaver, Utah
ALUNITE PLANNING AND DEVELOPMENT COUNCIL

December 3, 1976

DEPT. OF THE INTERIOR
RECEIVED
DEC 6 1976
BUREAU OF LAND MANAGEMENT
CEDAR CITY, UTAH

District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, UT 84720

Dear Sir:

The Beaver County Planning and Development Council has reviewed the Alunite Environmental Impact Statement. Based on our review and study, the Council has determined a need to respond with clarification suggestions and/or recommendations relative to the Socio-economic elements of Chapters IV and V of the statement.

It is the opinion of the Council that assumptions have been made in arriving at the adverse Socio-economic Conditions (Chapter V) which may tend to 'over state' potential adverse impacts. While we acknowledge that a number of these adverse impacts could be realized, this section states that many conditions will occur or that lead time problems will prevent mitigating measures being carried out to prevent or substantially reduce projected adverse impacts. It is also our opinion that some of the mitigating measures submitted by the Council to the BLM in April 1976, are perhaps not reflected in the preparation of Chapters IV and V. While it is acknowledged that mitigating measures must be carefully evaluated relative to their potential for application and impact, determinations to not apply some proposed actions or plans might be reviewed in light of additional information or clarifications.

The purpose of this response statement is to point up additional factors which perhaps should be considered by the BLM in finalizing Chapters IV and V of the Alunite EIS.

Employment

The Environmental Impact Statement on page 3-71 points out that: "It is not known how many jobs would be filled by existing residents, but it is expected that between 10 and 20 percent of all new jobs (those at the project site and those new non-basic jobs resulting from it) would be filled by existing residents."

Response:

Ⓐ Certainly, it is difficult to predict with any degree of accuracy the number of existing residents who will be employed. It would appear that the 10 to 20 percent figure for employment at the project site is reasonable in view of the skills required for project construction and operation.

Our review of this issue suggests, however, that the number of local people hired in non-basic employment could climb as high as 40-50 percent of the total new jobs.

According to Figure 3-2, page 3-75 (Employment Impacts - Alunite) non-basic employment expected as a result of Alunite Development will approximate 900 by the 15th quarter following implementation of the project. The Utah Process employment projections break the non-basic employment down into the following industry sectors:

Agriculture, Forestry and Fisheries	15
Mining	0
Contract Construction	54
Manufacturing	12
Transportation, Communications and Utilities	33
Wholesale and Retail Trade	323
Finance, Insurance and Real Estate	48
Services	209
Government	231
Total	925

Assuming a three year start-up period necessary to generate the demand for the 925 non-basic jobs plus a possible lag-time of 2-4 years mentioned in the Socio-economic section of the report, it may take as long as 5-7 years for non-basic employment to catch up with the demand for goods and services. According to the Utah Process projections over 50% of the non-basic jobs which will be available will be found in wholesale and retail trade and in services. Traditionally, many of those kinds of jobs do not require long periods of technical skill training. This would allow local people who have recently entered the labor force, or, who would like to change vocations to find employment.

In July of 1976, the Civilian Labor Force and Non-agricultural Payroll Employment in Beaver and Iron Counties was as follows:

Agriculture	Not Available
Mining	314
Contract Construction	365
Manufacturing	483
Transportation, Communications and Utilities	507
Wholesale and Retail Trade	1,939
Finance, Insurance and Real Estate	246
Services	814
Government	1,686
Total	6,354

It would appear that potential growth in the local employed labor force could fill a good percentage of the non-basic jobs over the estimated 5-7 year period required for the job market to meet the demand for goods and services. If, for example, the employed labor force in Beaver and Iron Counties grew at a rate 2% higher than normal. using the July, 1976 non-agricultural payroll employment as a base, approximately 600 new jobs could be filled locally. An increase of 2% in the rate of growth would not appear to be excessive in view of the large number of young people who migrate from the area due to the lack of employment.

It should also be emphasized that the local governments do jointly direct the use of manpower training funds (CETA) that are available to accelerate the preparation of local people for both basic and non-basic jobs related to the project. A Manpower Forecasting program is now being established by the local governments, colleges and State Job Service Office in the area, which is intended to facilitate more effective identification of job needs and training to meet the anticipated impacts of this and other proposed projects.

Transportation

The Transportation section on page 5-27 states: "Since specific plans to mitigate traffic congestion have not been made, it is not possible to determine unavoidable adverse impacts." The Highways section under mitigation on page 4-12 states: "there in not sufficient detail to evaluate the effectiveness of the plans."

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Response:

While it is true that sufficient detail is not now available to evaluate effectiveness of proposed plans, no reference is made to the commitment of Milford City and The State Department of Transportation in Chapter IV relative to transportation as provided in the mitigating measures statement of April 1976.

A. Proper advanced planning in developing new housing areas, shopping centers, schools, etc., will be initiated to minimize future traffic congestion problems and provide an adequate transportation system to serve those areas.

B. In those areas that are to be expanded, early zoning and purchase of right-of-way will be accomplished to insure that Milford City can expand in a planned and orderly fashion.

C. As more detailed advanced planning is accomplished by Beaver County and Milford City, The State Department of Highways will cooperate in the development of a specific plan to redirect and/or improve traffic flow and management in and around Milford City.

Water System - Milford

Ⓒ

The Unavoidable Adverse Impacts Section (page 5-27) states: " a new storage facility will be planned to accomodate expected future growth. Final planning for a new system would require 1 year before construction could begin, so it would not be ready in time to meet the needs of the new population."

Response:

Milford City has an Engineering Firm under contract to accomplish a study of water supply, distribution, and storage improvement needs to meet anticipated impacts of the Alunite Project. It is anticipated that funding will be made

(C) available for this study in December 1976. This firm also conducted the engineering work on the water system improvements recently completed in Milford.

This Engineering Firm projects that the improvements study will begin in December 1976 or January 1977. It will require approximately three months to complete. Detailed Engineering work on the project would require 3-4 months. Actual construction of all improvements should require from 6-8 months.

If the improvements study begins by January 1977, the initial study and detailed engineering design could be completed by July 1977. Construction begun in August 1977 could be completed by March 1978. (The bonding procedure could extent this time 60-90 days).

If formal Department of Interior approvals for project development are received in the Spring of 1977, it is estimated that heavy construction would not begin for about 12-13 months (Spring 1978). Based on these lead-time projections it is anticipated that water system improvements could be planned and constructed in time to meet project population impacts. It is recognized that meeting these time schedules is dependent upon funding availability. However, efforts are well underway to secure funding to support the preparation of a Financial Development and Management Plan which would address front end funding of Infrastructure development and preparation related to the Alunite Project.

(D) .Minersville-

Basic improvements on the existing water system in Minersville have been completed. The capacity of the main system has been doubled.

If Minersville receives projected population impacts, further improvements will be needed in the water system. Engineering estimates indicate that preliminary and final engineering design, bonding procedures and construction of improvements could be accomplished within 10-12 months.

Education

(E) The Education Section in Chapter IV (page 4-13) states: "although the Beaver County District is not committed to carry out mitigating measures it is expected that they would accomplish their plans."

Response:

In the statement of Mitigating Measures provided to the BLM by the Planning and Development Council in April 1976, the section on Education stated the following:

1. 'Administration of the school district has stated that it will be prepared to accomplish additional advanced planning and development to meet these impacts, and has identified preliminary alternatives to accomplish this task.

2. Legislation was enacted in Utah in 1976 to provide funding mechanisms to assist school districts to plan and prepare for growth impacts generated by industrial development.
   - Prepayment of Sales and Use Taxes by developing companies.
   - Appropriation of excess Federal Revenue Sharing Funds to meet school building needs.

These statements affirmed: the intent of the school district to initiate action to meet projected impacts; the availability of funding mechanisms to assist in planning and preparation for impacts on the schools; and the fact that administration within the school district has identified preliminary alternatives to preparation for the project.

Public Health

(F) It might be suggested that the term 'Public Health' be changed in the EIS since it technically relates to an element of the Medical Care Delivery System rather than the system itself. The content of the discussion under this heading apparently relates to Primary Medical Care since it is concentrating on physician services.

(G) The Public Health Section (page 5-28) states: "There are no plans to recruit more physicians, a shortage could result causing area residents to travel further for medical attention."

Response:

G Health Care assessment accomplished in Beaver County under the direction of the Planning and Development Council, pointed up the following:

1. Two Medical Care Clinics presently exist in the County (Milford and Beaver).
2. Both clinics have assessed present and projected physician needs for the county.
3. Both clinics have indicated that, based on their assessment of existing and future needs, they will be prepared and planning to expand personnel and services as needed.

A plan does exist to recruit new physicians to the area as population increases. Phase I of the plan is to encourage and facilitate expansion of existing clinical services in the area, through the clinics themselves. Assessment indicated both clinics are receptive to expansion and one clinic has initiated action to attract a new full-time physician and has investigated new Clinic Space.

Phase II would be to recruit and/or facilitate placement of physicians or health care practitioners in areas of the county which do not now have ready access to physician services.

While mitigation measures planned in Health Care were not requested from the Council, the EIS staff might refer to the assessment document 'Planning for Growth in Beaver County' Volume II, page (383) for further clarification of proposed community action to meet health related impacts.

Housing Demands

H The Housing Demands Section on page 5-28 of the EIS identifies "a major unavoidable adverse impact due to a lack of available housing." It also states on page 5-29: "Since there are no mitigating measures planned to speed the availability of housing, low quality or substandard housing could develop, as well as crowded mobile home parks."

Response:

Since the preparation and submittal of mitigation measures to the BLM by Beaver County and impact communities, Milford City has conducted more specific discussions with housing development firms. It is estimated that the work-force needed to accomplish the project on-site preparation during the first year will require 60-70 new dwelling units. These units may be needed by Summer or Fall 1977. It is also projected that from 300-450 additional new dwelling units will be needed during the second year of the project. Some of these initial dwelling unit needs may be met by construction worker quarters provided at the project site.

Housing Development firm review of the housing needs, development time schedule, existing infrastructure and housing situation in Milford point out that:

1. Once the development company has determined to move forward with the Alunite project and has received necessary basic approvals, funding could be available to facilitate large scale dwelling unit development.
2. If decisions and approvals to proceed with development are received by the Spring of 1977, dwelling units required to meet initial on-site project preparation worker needs could be developed by Fall of 1977. H
3. Development Firm projections indicate that 200-250 dwelling units could be prepared each quarter after initial preparations are complete.

    These units would be single family dwellings in single and multiple structure arrangements. Heavy emphasis would be placed on mobile home units during the construction period of the project.

At the peak period of construction it is estimated that approximately 795 single and multiple housing units and 971 mobile home spaces will be needed.

* Projectiong Maximum Needs

	Total	Mobile	Single
1st year	72	65	7
2nd year	576	490	86
3rd year	1295	971	324
4th year	1687	1097	590
5th year	1765	971	794

*Housing Demand Chart - 'Planning for Growth in Beaver County - Volume II', Page 114.

Based on maximum estimates of new single and family dwelling units needed per year and assuming production rates of 180-200 per quarter, it appears that a time schedule for development could be accomplished to keep pace with the project time table in both Milford and Minersville.

H

While it is true that lack of funding and construction support services could restrict dwelling unit development, it is not anticipated that Milford or Minersville must assume an unavoidable adverse impact due to lack of available housing.

Although housing development and funding firms will not make commitment or complete final plans related to mitigating housing impacts until final decisions to proceed with the project are received, Milford City has initiated action to: (1) identify potential development sources; (2) measure the potential and resources of available firms; and (3) determine the feasibility of preparing housing units needed within the development time schedule.

Quality of Life

It is recognized that study and analyzation of future events so as to determine expected changes in Quality of Life resulting from Project Impact is a difficult task.

I

1. Our review of the Quality of Life Section in Chapter V (5-20) suggests there exists a conflict in the introductory statement of that Section. That Section states: "There would be no mitigating measures to specifically reduce impacts to quality of life, but the severety and duration of impacts would depend on the effectiveness of planned mitigating measures. After mitigating measures were applied their effectiveness would help determine the impacts to quality of life."

   - It seems that this statement says no mitigating measures can be applied to reduce or prevent reduction in Quality of Life and yet acknowledges that application of mitigating measures will influence quality of life.

J

2. It is further suggested that additional information may suggest the need for a careful re-evaluation of the content of this section.

K

3. The question might be asked, are community homogeneity, public attitudes and availability of goods and services the only factors that impact or make up Quality of Life?

L

4. Beaver County committed to and is presently accomplishing a total revision of its ordinances and codes. Effective codes and ordinances are identified as strong mitigating mechanisms in relation to fragmented fringe settlements development in unincorporated areas.

   These ordinances and codes have been developed to compliment those of Milford City. It is expected that this action underway by Beaver County will greatly assist efforts to encourage and guide population growth to where services are available.

In conclusion, may we re-assure the EIS preparation staff of our desire to strengthen the Socio-economic sections of the Alunite EIS. The Planning and Development Council was organized in Beaver County and assessment work completed because:

1. Our county and communities, their values and quality of life are important to us.

2. While we support the need for economic development and opportunity, it is important that it is considered and planned wisely.

3. We recognize our responsibility to effectively understand, plan and prepare for orderly growth and development in the county and communities.

4. We wanted to insure that the submittal of our joing mitigating measures statement in April 1976 was based on as much understanding of problems and possible solutions as may be possible.

This statement was prepared and is submitted within the spirit of these Council objectives. If we can be of further assistance in clarifying any of our suggestions, please feel free to contact us.

We have appreciated the cooperation of the BLM and EIS staff in the past and shall look forward to working with you more in the future.

Sincerely,

Fred B Harris.

Fred B. Harris
Chairman

FBH/tk

Alunite Planning & Dev. Council

It is indicated that "an increase of 2% in the rate of growth would not appear to be excessive in view of the large number of young people who migrate from the area due to the lack of employment."

A difficulty with this statement is that Utah Process baseline projections for the District indicate that in both 1980 and 1985, there will be a relative shortage of labor in the area, resulting from in-migration into the area to fill jobs that can't be filled by the area labor force. This suggests that, should the Alunite Project go, virtually none of the additional non-basic jobs would be filled by the local population; unless you assume:

1. Labor force participation rates increase because of the abundance of work in the area. The projections for the area do not assume an increase in participation rates. This is not a very good assumption judging from actual experience in boomtown areas.
2. Underemployment in the area. Employment Security estimated that during 1976, approximately 1000 people in the District were "underutilized", i.e., employed part-time or not in labor force but should be.

What is suggested, is that more than 10-20% of new non-basic jobs could be filled by local population, but we argue it on the above grounds.

In addition to the response concerning Milford City water supply, the following information should be taken into consideration:

(M)

The impact statement implies that without the additional storage capacity, the system will be unable to handle the demands for the new population. The expansion presently being constructed by the city of Milford will give the delivery capacity to the system to meet and exceed the new population demands during the planning and construction period for the storage facility. The system will be capable of supplying the needs of the new connections except under emergency situations such as power failure.

It is felt that the present wording does not reflect this situation.

It has been indicated by The State Health Department, that although storage is a requirement for complete certification, that on a case by case basis conditional approval can be granted without the minimum storage capacity being met, if the delivery capacity exceeds the minimum requirements.

DEPT. OF THE INTERIOR
RECEIVED
DEC 6 1976
BUREAU OF LAND MANAGEMENT
CEDAR CITY, UTAH

RESPONSE

21. Alunite Planning and Development Council

A. It is agreed that total employment supplied by existing residents could be higher than 10 to 20 percent. This range has been changed to 20 to 50 percent in the final statement. This estimate is based on a low range of 10 percent project employment and 25 percent nonbasic employment (about 20 percent total), and a high range of 20 percent project employment and 75 percent nonbasic employment (about 50 percent total).

B. Appendix D in the draft statement contains a copy of all mitigating measures planned by the Alunite Planning and Development Council. Page D-4 shows the measures planned for transportation.

C. Changes in the statement have been made to reflect improvements which have been completed. It has also been noted that there is a possibility of improvements being completed in time to meet the needs of the new population.

D. The text has been changed to include improvements which have been completed. The fact that improvements to meet the needs of the new population could be completed in time to avoid adverse impacts has also been added.

E. Appendix D in the draft contains a copy of all mitigating measures planned by the Alunite Planning and Development Council. Pages D-8 and D-9 show education-related plans.

F. Concur. "Public Health" has been changed to "Primary Medical Care".

G. A section has been added to Chapter 4 stating that medical care clinics have assessed projected needs and would be prepared to expand personnel and services as needed. Chapter 5 has been changed to acknowledge the fact that medical care clinics have plans to recruit additional personnel, but it is not known if these plans would be successful.

H. These mitigating measures have been added to Chapter 4. Chapter 5 has been changed to reflect that if these mitigating measures are successful, adverse impacts could be avoided in Milford.

I. The wording has been changed slightly in order to make this concept more clear. This section now states: "There would be no mitigating measures to specifically reduce impacts to quality of life, but the severity and duration of impacts to quality of life would depend on the effectiveness of planned mitigating measures for utilities, education, public safety, primary medical care, and housing".

J. Since additional information on the quality of life is not available to us and you have provided none, there is no further basis with which to reevaluate the contents of this section.

K. Page 2-107 in the draft states that there are many factors influencing quality of life, but that community homogeneity, public attitudes, and availability of goods and services were areas about which information was available; thus, these were the only areas that were discussed.

L. Page 4-4 in the draft states that Beaver County and Milford are revising ordinances and codes. These actions should discourage settlements in unincorporated areas and encourage growth in areas where more services are available. However, it appears that initially there would be a lack of services, and this would have a negative impact on the quality of life.

M. The text has been changed to indicate that if storage improvements were not completed in time, inadequate storage would result, but that the system may be able to handle the water demands.

㉒

December 7, 1976

Bureau of Land Management
District Office
P O Box 729
Cedar City, Utah 84720

Gentlemen

We are writing this letter to protest the proposed Alunite Mine and processing complex to be located in the Southern part of Wah Wah Valley.

Our family has been engaged in the livestock raising business in this valley for many years. My grandfather grazed large numbers of sheep here many years before the Taylor Grazing Act came into existence. It has been our desire to operate in such a manner as to encourage the vegetative species of the area to multiply and flourish and as a result the Willow Creek Allotment is one of the best on the entire West Desert.

In the final analysis, any business is able to survive only if economic conditions permit it to make a reasonable profit. For a number of years now the livestock industry has been operating under conditions which have not permitted a reasonable return on investment.

The data in the environmental impact statement admits to the fact that additional new burdens and problems will come to livestock operators in this area when these proposals are implemented.

Ⓐ It is our considered opinion that we cannot operate as a viable economic unit if such additional burdens and problems are placed upon us. We therefore vigorously protest the construction of the Alunite mine and processing complex.

Yours truly

Cannon Livestock Co., Inc.

Lloyd W. Cannon
President

RESPONSE

22. Cannon Livestock

A. It is recognized that significant adverse impacts would occur to livestock operators in the area of the proposed project. These impacts are discussed in the land use sections of the draft statement. Your comment letter will be printed in the final statement and will be considered in the decision-making process.

㉓

nsa ALUMET
(303) 278-3033
607 10th STREET, SUITE 203 • P. O. BOX 630 • GOLDEN, COLORADO 80401

December 6, 1976

Mr. Morgan Jensen
Bureau of Land Management
Cedar City, Utah 84720

Dear Mr. Jensen:

This letter represents the response and comments of Alumet to the Draft Environmental Impact Statement on the proposed alunite project in Beaver County, Utah. Generally speaking, the EIS is quite good. It fairly and objectively expresses the potential impacts of the development and operation of the project.

There are, however, a number of corrections which should be made in the preparation of the Final EIS.

(A) Page 1-5; Para 2: The right-of-way is listed as 15 miles; our estimate is 12 miles.

(B) Page 1-7; Para 1: Sentence two should be corrected to read "....significant deterioration review will consider sulfur dioxide and particulate emission sources...." These are the only pollutants under PSD regulations.

(C) Page 1-36; Fig. 1-8: Block (5), Dissolve Potassium Sulfate, should have the "Water" arrow into the box, not out.

(D) Page 1-45; Figure 1-10: Block (5) should read "Absorb SO_3 in 98% acid.

(E) Page 1-62; Table 1-7: Power plant under slurry solids should read "...calcium sulfite and calcium sulfate".

(F) Page 1-85; Para. 4: "...locations of these stations will depend on..."

(G) Page 2-83; Fig. 2-21: Remove overlay of large scale plant and mine area which are incorrectly positioned on this figure.

(H) Page 2-105; Table 2-31: Under Milford "Value," the number is in error.

(I) Page 3-5; Para. 2: Baghouses are estimated at 99.6% effective, not 99%.

(J) Page 3-6; Table 3-2: Potassium Sulfate emissions incorrect; alumina calcining emissions left out. See Table 1-6, p. 1-58.

(K) Page 3-45; Table 3-7: Why are the last three rows offset?

(L) Page 3-46; Para. 2: The acreages or deer and horse habitat losses appear too large. The area of the tailings ponds is not frequented by deer or horses.

(M) Page 3-51; Para. 2: The archaeological survey by Berge does not suggest any significant losses of artifacts by the development of the project.

(N) Page 5-2; Para. 1: Baghouses are estimated at 99.6% effective, not 99%.

(O) Page 5-3; Table 5-1: Potassium sulfate emissions are incorrect; see Page 3-6, and Page 1-58, above.

(P) Page 8-53; Fig. 8-6: Road R-2 is not shown.

While Alumet does not completely agree with all of the conclusions drawn, the EIS is an even-handed evaluation. If

Mr. Morgan Jensen
December 6, 1976
Page 3

there are any questions or need for clarification, please feel free to call.

Very truly yours,

ALUMET

James H. Viellenave
Project Manager
Environmental Services Division

JHV/adg/231E
cc: H. A. Perry
W. R. Tipton
W. W. Walker

RESPONSE

23. Alumet

A. The 15-mile figure for the length of the water system right-of-way across federal land was in error. It has been changed to 12 miles in the final statement.

B. Concur. The text has been changed.

C. Concur. This change has been made in figure 1-8.

D. Concur. This change has been made in figure 1-10.

E. Concur. This change has been made in table 1-7.

F. Concur. This change has been made in the text.

G. This printing error has been corrected in the final statement.

H. Concur. The correct figures have been out into the final statement.

I. Concur. The text has been changed.

J. Concur. Several other errors were noted in table 3-2 and they have been corrected in the final statement.

K. This typographical error has been corrected in the final draft.

L. It is true that deer and wild horses do not make frequent use of the proposed tailings pond site. However, these animals have occasionally been observed in the area, and they could make substantial use of these lower elevations following heavy snowfall in the mountains.

M. The archaeological survey by Berge did not cover the entire area to be directly affected by construction of project components or the adjacent areas that would be indirectly affected by the increased human activity. Furthermore, the evaluation of sites located in the survey is considered by BLM archaeologists to be of limited value.

N. Concur. The text has been changed.

O. Concur. Errors have been corrected in the final statement.

P. The purpose of figure 8-6 is to show alternative road systems for access to the plant site from adjacent communities. For this reason, internal roads such as R-2 which leads from the processing plant to the mine were not shown.

(24)

United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:
L7619 (RMR)CS

DEC 0 6 1976

Memorandum

To: Director, Bureau of Land Management

Through: Assistant Secretary for Fish and Wildlife and Parks

From: Associate Director

Subject: Draft Environmental Statement, Alunite Project, Utah (DES 76-43)

As requested in your memorandum of October 20, 1976, we have reviewed the subject statement and offer the following comments.

Ⓐ It is our judgment that this document does not adequately address the ambient air quality question in relationship to the proposed development. We are concerned that during periods of high wind the area in question will be subject to considerable dust production. We anticipate that this will adversely affect Cedar Breaks National Monument. Moreover, the view from Cedar Breaks National Monument, in the direction of such known landmarks as Wheeler Peak in Nevada, will in all likelihood be so impaired as to make it no longer visible. The draft statement does not provide data on wind patterns needed to make an assessment of the severity of the dust generated by plant operations upon Cedar Breaks National Monument. If such drifting dust is to become a characteristic phenomenon, it would be desirable to know how many days a year such atmospheric conditions are to be anticipated.

Ⓑ The draft environmental statement fails to identify sources for and evaluate the environmental consequences of the development, extraction and transportation of 1.15 million tons of coal and 1.525 million tons of calcined phosphate rock. On page 1-78, it is indicated that "Since a definite coal source has not been identified a separate environmental analysis may be required * * *." On page 1-97, "Alumet is proposing the development of a new phosphate mine and processing facility in southeastern Idaho. This proposal and other phosphate developments will be evaluated in an EIS being prepared by U.S. Geological Survey." The source of coal and phosphate, both essential to the operation of the proposed facility, should be identified, and their impacts evaluated in this draft environmental statement.

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Ⓒ There are some apparent discrepancies in interpretation of data pertaining to air quality. On page 2-19, the narrative states, "It is apparent that background air quality levels at the proposed alunite site for sulfur dioxide, nitrogen oxides, and particulates are well below the federal standards." On the same page, in table 2-8, it is shown that the maximum 24-hour average concentration of particulates at the lower monitoring station on the site was 170.6 micrograms per cubic meter, as compared to the Federal secondary ambient air quality standard of 150 micrograms per cubic meter. Two statements on page 3-24 indicate that the 24-hour average for particulates would apparently exceed the Federal ambient air quality standards because of high background levels of dust, and that it is likely that Class II standards would not be met. A statement on page 2-17 also recognizes the excessively high concentrations of particulates attributed to strong winds and natural dust. Our conclusion, based on data presented in the draft environmental statement and statements throughout the document to the effect that background levels exceed the secondary air quality standard for maximum 24-hour average concentrations of particulates, is that the narrative on page 2-19 is in error and that the standard is being exceeded.

Ⓓ In those portions of the draft environmental statement where excessive concentrations of particulates are acknowledged, it is uniformly attributed to wind-borne natural dust. The desired conclusion is apparently that since the problem is a characteristic of the desert, the air quality standard should not apply. We are unaware of any provision in the law or regulations that implies that pollutants extant in the ambient air that are not directly the result of man's endeavor should be discounted from the background increment when comparing the effects of a proposed new source with the ambient air quality standards. We would suggest on that basis that the "Summary of Environmental Impacts" on page iii include a comment to the effect that the existing excesses over secondary ambient air quality standards for particulates will be exacerbated by the proposal.

Ⓔ Wind-borne soil particles are invariably described as "natural dust" throughout the draft environmental statement. This is, we feel, an unjustifiably casual dismissal of the poor ambient air quality relative to particulates in the project area. There is no meaningful discussion of total area within the vicinity of the project with soil surface disturbance resulting from outdoor recreational vehicle activities, or loss of surface crust or soil binding vegetation as a result of grazing. Although desert environments may under even the best of circumstances produce "natural dust," it is inaccurate to categorize all dust in this area as natural. Field examination of the project area and its surroundings brings readily to view many roads and trails in and near the project

Ⓔ site. Closer examination than could be given during the review period would be required to confirm that the soil surface has been loosened and denuded by overgrazing. Our impression is that most sources of dust in the area involved originate from human activity, either directly as a result of indiscriminate use of machines, or indirectly as a result of grazing.

Ⓕ It is a matter of further concern that the proposal, as described, is a particularly dirty project in terms of surface disturbance and dust. Yet, climate in the locale is such that revegetation of disturbed areas as a mitigating measure is given little chance of success. The other mitigating measures proposed for dust suppression are either ill-defined or tentative to the extent that they are unenforceable, or merely tokens that fail to respond seriously to a grave environmental concern. Population increases resulting from the project are also expected to increase the amount of outdoor recreational vehicle use in the surrounding countryside, contributing further to degradation of air quality for particulates. Projections of increases in particulate loading resulting from dust are apparently not included in estimates of emissions resulting from the project. This, plus the existing background particulates, could easily exceed even the Federal primary ambient air quality standards for maximum 24-hour average.

Ⓖ On page 6-4, the statement is made, "The proposed action would meet Class II Environmental Protection Agency Significant Deterioration Regulations standards but short-term concentrations of sulfur dioxide and particulates would come very close to the limit allowed * * *." This is inconsistent with statements found on pages 3-18, 3-24 and 5-7, which indicate that ambient air quality standards for maximum 24-hour average concentrations of particulates will be exceeded; and that annual, and maximum 3-hourly averages for sulfur dioxide, and maximum 24-hourly averages for particulates would exceed Class II standards in a small area southwest of the plant.

In view of the conclusions of the draft environmental statement, it would seem appropriate to point out in the summary that, rather than as is stated " * * * emissions * * * would result in deterioration of air quality.", Federal ambient air quality standards and prevention of significant air quality regulations will be violated.

Ⓗ In view of the above, it would appear that some attention needs to be given to the relationship between the anticipated impacts on air quality of the proposal and laws and regulations pertaining thereto. On pages 1-3 through 1-8 which lists those actions necessary by Federal and State Agencies, there is no indication of a need to reclassify any area from Class II to Class III under the prevention of significant air quality deterioration regulations. On page 1-7, it is indicated that the Environmental Protection Agency will determine whether the proposal would cause a deterioration in air quality beyond Class II limitations. That determination has been made in the draft environmental statement. The conclusion is that Class II incremental increases will be exceeded in the local area. As we understand it, the Administrator of the Environmental Protection Agency does not have the latitude to issue permits to violate the regulations. It appears to us that there is a necessary step that has not been addressed if the proposal is to proceed. That step is the reclassification to Class III of that area in which Class II increases will be exceeded. The procedures for accomplishing reclassification are described in the regulation.

Ⓘ The more critical constraint on the proposal brought about by air quality protection laws is in the area of relationship between particulate loading and the primary and secondary ambient air quality standards. The draft environmental statement provides insufficient data to proceed toward a determination as to the acceptability of the proposal under the constraints of the Clean Air Act. The data that is presented leads to the conclusion that the proposal is not acceptable. This leaves the Administrator of the Environmental Protection Agency's role also inadequately defined on page 1-7 inasmuch as he is responsible for administering in provisions of the Clean Air Act since the State of Utah does not have an accepted air quality management plan.

Ⓙ Degradation of visibility is treated superficially, and comes to the conclusion that Wah Wah Valley itself will be the only area adversely affected. Unfortunately, there is not enough information in the draft environmental statement to form any other opinion. The major block of data lacking here, as with other air quality evaluations, is that pertaining to dust.

Ⓚ The draft environmental statement establishes that a substantial number of cultural resource sites of historical and archeological significance have been identified within the areas of terrain that will be affected by project developments. However, it does not establish with sufficient clarity which of the sites identified meet the criteria of the National Register of Historic Places.

Ⓛ We have found in the several cultural resources sections of this document a basic contradiction. On the one hand, with regard to historic sites, we note repeated statements that their scientific values are unknown; and with regard to archeological sites, we note the statement that data are

(L) not available on the significance or importance of such sites in the area of concern. Consequently, as is stated on page 3-51, no quantification can be made as to the scientific values that might be lost in the course of project development. Yet, the document states on page 3-52 that there are no cultural resource sites eligible for nomination to the National Register known to occur in the area of concern. Until professional evaluation of these sites has been completed, the assumptions that there are no cultural resource sites eligible for listing in the National Register, and the Advisory Council on Historic Preservation has no involvement in this matter, are premature.

(M) While we note that the State Historic Preservation Officer was contacted concerning the impact of the proposed development on the cultural resources of the area, the final environmental statement should include a copy of his letter of comment. There is always a possibility that a proposal will affect a cultural resource site which may be in the process of nomination to the National Register. Moreover, since there will be, as well, a high potential for serious impact upon archeological sites, we suggest further that Dr. David B. Madsen, State Archeologist, Department of Development Services, 603 South Temple, Salt Lake City, Utah 84102, be consulted and a copy of his letter of comment included as well in the final environmental statement.

(N) It is apparent that all areas of terrain that will be affected by the proposal have not been professionally surveyed for archeological resource sites. These include the remainder of the processing complex site, the area of tailings ponds, sewage disposal, gravel pits, access roads, and all other terrain that will be affected by the construction of support facilities. Accordingly, we suggest that arrangements be made to complete the professional survey of these areas in advance of construction, and that the final environmental statement include the recommendations of the principal investigators.

(O) We have but one further suggestion and this relates to procedures that will be followed to ensure the protection of cultural resources once construction has commenced. Against the possibility that previously unknown archeological resources are discovered during construction, the final environmental statement should include specific guidelines for immediate work stoppage, notification of the State Historic Preservation Officer, and evaluation by a professional archeologist for possible excavation, if warranted. Whatever action is taken should provide to the maximum extent possible for mitigation of all noted project-related adverse impacts upon such cultural resources and be in compliance with the Advisory Council on Historic Preservation "Procedures for the Protection of Historic and Cultural Properties" (36 CFR, Part 800).

5

RESPONSE

24. National Park Service

A. As stated on page 3-21, it is likely that considerable dust would be produced from the mine and plant site. However, it is not reasonable to expect that this fugitive dust would directly affect Cedar Breaks which is nearly 60 miles away. The agricultural areas in the Escalante Desert, Cedar Valley, and near Parowan, as well as disturbed areas adjacent to Cedar City, are existing sources of fugitive dust which are closer to Cedar Breaks than the proposed project site. The amount of dust contributed by the alunite project to the ambient air of Cedar Breaks would be extremely small in comparison with that contributed by existing sources. Potential impacts on visibility are discussed beginning on page 3-21 of the draft statement and based on the data presented in this section, it is not anticipated that the view of Wheeler Peak would be significantly affected on calm days with good visibility. However, even without the project, Wheeler Peak is not visible on windy days when particulate levels are high or during temperature inversions when visibility is poor. Certainly, the project would contribute substantial amounts of particulates to the air during windy conditions, but it is not valid to assume that the proposed project would significantly alter the existing visibility conditions from Cedar Breaks.

Information on wind frequency, intensity, and direction is presented on pages 2-9, 2-10, 2-11, 2-12, and 2-13 of the draft statement. From the data presented in table 2-2 and figure 2-3, it is apparent that prevailing winds are from the south and north and that winds blowing from the project site toward Cedar Breaks occur infrequently. It is concluded from your comment that you overlooked this information in your review of the draft statement.

B. The discussion on the coal source has been expanded in the fuel requirements section of Chapter 1 of the final statement to indicate possible sources of coal for the proposed project. However, the applicant cannot identify a definite coal source at this time and an evaluation of specific impacts associated with the coal source is not included in the final statement. This decision was reached by the Director of BLM after considerable discussion with the applicant indicated that their plans were not far enough along to allow a realistic evaluation of any of their possible sources. At this point, it would seem that purchase of coal on the open market is the most likely source. If the coal was to come from a new source or expansion of an existing source on federal land, it would certainly be subject to environmental analysis and is possibly being considered in one of the Regional Coal Environmental Statements. If the coal was to come from a new or existing source on private or state lands, it would be subject to the environmental analysis requirements of the state which has jurisdiction.

The analysis of impacts associated with the mining and calcining of the phosphate rock is covered in the Draft Environmental Statement (U.S. Department of the Interior, DES-76-15) prepared jointly by the U.S. Geological Survey, Bureau of Land Management, and the U.S. Forest Service. There is no reason why the analysis presented in this document should be repeated in the final alunite environmental statement.

C. The statement on page 2-19 is in error. It should read: "It is apparent that background air quality levels at the proposed alunite site for sulfur dioxide and nitrogen oxides are well below the federal standards. However, the observed maximum 24-hour average particulate concentration exceeds the federal ambient secondary standard".

D. The purpose of an environmental statement is not to justify a desired conclusion, but to describe the existing environment and to make a full disclosure of potential impacts that would result from a proposed action. It is agreed that there is no legal provision for discounting the existing high particulate levels from the background increment no matter what the source may be. The possibility that federal ambient air quality standards for particulates could be exceeded is noted on pages 3-21, 3-24, and 5-7 of the draft statement. This unavoidable impact, as well as the others evaluated in the environmental statement, will be considered in the decision-making process. Because of the general scope of the summary on page iii, there is no apparent reason to add this specific impact in the final statement.

E. The term "natural dust" has been changed to background particulate levels in the final statement. As you point out, it is entirely possible that most of this dust results from past and present human activity. However, since there is no data on particulate levels prior to man's use of the area, it is not fair to assume that the periodically high particulate levels are entirely due to human activity.

F. The problems of fugitive dust are discussed on pages 3-20 and 3-21 of the draft statement. As you point out, projections of increases in particulate loading resulting from fugitive dust are not included in estimates of emissions resulting from the project because there is no realistic way of measuring the production and dispersion of particulates from such sources as the tailings ponds and the mine area. The fact that federal ambient air quality standards could be exceeded during strong wind conditions, especially after a prolonged absence of precipitation, is stated on page 3-21 of the draft statement. However, it should be noted that ambient air quality standards could be exceeded without the project under these same conditions.

G. The information on page 6-4 is not correct and will be revised to be consistent with the impact analysis in Chapter 3 in the final statement. The purpose of the summary is to provide general information on environmental impacts, not to discuss such specific items as compliance with federal regulations.

H. Since it is apparent that Class II incremental increases would be exceeded, the applicant has submitted changes in the proposed action which are considered in the final statement. The state and federal actions necessary to reclassify the area from Class II to Class III have been added to the final statement.

I. All available data on particulate loading in relation to ambient air quality standards have been presented in the environmental statement. The adequacy of this information will have to be considered in the decision-making process. The necessary changes in required state and federal actions were discussed in the previous response.

J. Without a specific comment pointing out how the impacts to visibility could have been more completely evaluated, no revisions can be noted in the final statement. It is agreed that information on fugitive dust is lacking but in the absence of any method to obtain better data, the conclusion that only visibility in Wah Wah Valley would be adversely affected is indicated by the data that is available.

K. The discussion of cultural resources in Chapter 2 of the final statement has been expanded to provide all the information available on potential National Register properties.

L. Concur. The text of the final statement has been changed to provide for professional evaluation of cultural resource sites with appropriate action in the event that sites with National Register potential are identified.

M. The Department of Development Services has reviewed the draft statement and their letter commenting on the draft is included in the final statement.

N. Concur. A mitigating measure requiring an intensive archaeological and historical survey of all areas to be disturbed by construction has been added to Chapter 4 of the final statement.

O. Concur. A mitigating measure requiring the presence of a professional archaeologist during actual dirt moving construction operations has been added to Chapter 4 of the final statement.

(25)

United States Department of the Interior
BUREAU OF RECLAMATION
WASHINGTON, D.C. 20240

IN REPLY REFER TO: 430
125.

DEC 2 1976

Memorandum

To: Director, Bureau of Land Management

From: Assistant Commissioner of Reclamation

Subject: Draft Environmental Impact Statement--Proposed Alunite Project (DES 76-43)

As requested in your memorandum of October 20, 1976, we have reviewed the subject environmental statement. We are enclosing our comments which are divided into two sections (general and specific) for easy reference.

EF Sullivan

Enclosure

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

Bureau of Reclamation's Comments on Draft Environmental Impact Statement—Proposed Alunite Project (DES 76-43)

General Comments

(A) We believe two aspects of the proposal are not sufficiently analyzed and could result in significant impacts. They are (1) the pollution of the ground water by seepage from the 1,250-acre tailings ponds and (2) pollution of surface and ground waters from the 175-acre waste rock pile.

(B) We note from page 1-59 that separate silica and gypsum tailings ponds could be located directly north of the site complex on permeable unconsolidated valley fill deposits and "The floors of the pond areas would be compacted to reduce permeability of the underlying material Figure 1-2 shows the ponds located on upper valley fill slopes in the general area of proposed sand and gravel pits. Thus, the location would appear to be in an area of coarse-grained materials where the water table is relatively deep. Losses from the tailings pond to the aquifer would be expected to be high despite compaction of the pond floors.

(C) On page 3-28 the estimated water losses from the ponds appear to be based on little data and many assumptions. Thus, it is possible that without pond floor treatment, other than compaction, the actual seepage could exceed the estimated seepage significantly.

(D) The quality of the seepage water is not adequately described on page 3-31. The slurry entering the silica tailings pond would contain about 12 percent potassium sulfate, 5 percent sodium sulfate and 0.33 percent sodium hydroxide. Assuming that the seepage would contain about the same concentrations, one could estimate the seepage water salinity to be about 17.3 percent TDS or 173,000 ppm TDS.

(E) Table 2-10 estimates the annual natural groundwater recharge of 10,000 acre-feet per year. Thus, the seepage rate at the estimated minimum would be 3 percent of the total natural recharge and if the actual seepage rate was 3.3 times as much as expected, it would equal 10 percent of the natural recharge. We are concerned that the impacts of project seepage on future groundwater quality in Wah Wah Valley do not adequately address the potentially serious effects on the long-term quality of the Wah Wah ground water.

(F) There is no mention of plant safety features in chapters 1 or 4 to protect the health of plant employees. For instance, the levels of silica dust and sulfur dioxide in some of the plant areas seem to hold significant potential for lung damage to employees. In chapter 3, it might be desirable to discuss the potential for respiratory health problems the plant may hold for employees.

Specific Comments

Ⓖ Page 1-66, last paragraph. It is never explained in the statement why the applicant has filed for the use of 32,600 acre-feet of ground water annually when the estimated annual needs for project operation are less than 8,000 acre-feet annually. The reviewer is left wondering if there are not plans for drastic expansion which are not addressed in the statement.

Ⓗ Page 1-72, first paragraph. It is not clear why the State or Federal Government would provide public funds for the construction of the paved access road (R1) to the plantsite.

Ⓘ Page 1-73, last paragraph. The applicant states that cross drainage culverts for the railroad would be designed for "the maximum probable drainage." This criteria is used for the design of spillways for dams, not for the cross drainage for a railroad grade. Cross drainage structures for railroads are usually designed for 25-year frequency floods.

Ⓙ Page 1-85. Although the monitoring program is exhaustively explained, it seems to be planned in the interest of pure science. There are no apparent contingency plans for plant operation developed around the data gathered in the event that the data disclosed the potential for impacts substantially different from those predicted in the statement.

Ⓚ Page 2-32, figure 2-10. No groundwater monitoring or sampling facilities are planned in Wah Wah Valley north (assumed downgradient) from the project well field and tailings ponds. Such facilities, designed to monitor and sample all aquifer zones, would be necessary to adequately monitor effects of project pumping and tailings pond contamination on ground water.

Ⓛ Page 2-62 to 2-67, Cultural Resources - History and Archaeology. This section is not in compliance with Department of the Interior directives or the National Historic Preservation Act. The statement gives practically no information on the sites; therefore, the reader is unable to come to any conclusion as to their value. Apparently, no evaluation of these sites has been undertaken to determine if some might be eligible for the National Register or worthy of salvage, and no coordination efforts have been initiated with the Utah State Historic Preservation Officer as required by law. No mention is made here or elsewhere in the statement of what plans there are for surveying the remaining lands. Finally, the concluding sentence in this section, which claims that within the project area "there are no archaeological properties or historic sites . . . eligible for nomination to the National Register of Historic Places," is premature and unsupportable on the basis of the information presented in the statement.

Ⓜ Pages 2-70 and 2-79. The hunting-use figures on a regional and project area basis are confusing.

Ⓝ Page 3-2, Climate. No rationale or data were provided to support the conclusion that there would be "no measurable impact on climate."

Ⓞ Pages 3-2 to 3-24, Air Quality. This section goes into considerable detail as to the effects of plant operation on air quality; however, the change in air quality is not, with the possible exception of fluoride, related consistently to the secondary impacts on other elements of the environment, e.g., human. It might be advisable to have a cumulative impact section on air quality which deals succinctly with the secondary impacts on these other areas.

Ⓟ Page 3-25, Topography, second paragraph. The waste rock pile would occupy a dry canyon and would raise the canyon floor about 400 feet over a length of 1.5 miles to create a 175-acre plateau. Precipitation and surface runoff will filter through this fill material and may further contaminate the ground water. We were unable to determine if this waste area would be revegetated. The problem should be addressed and estimates of impacts be provided.

Ⓠ Page 3-33. The assumption throughout the statement seems to be that the seepage of raw sewage will not have any significant adverse impact on the areas's environment (Milford's in particular), since seepage has occurred in the past with little noticeable impact. This seems to be a rather perfunctory analysis, and does not admit that the problems will be magnified many times over anything that has occurred in the past because of the "boom town" situation accompanying project development. Moreover, the likelihood of inadequate municipal water and sewage treatment facilities in Milford has potential impacts upon the public beyond simply water quality.

Ⓡ Pages 3-44 to 3-52, Wildlife and Wild Horses. There was little discussion and no conclusions reached on the impacts to dislocated animals.

Ⓢ Page 3-50, second paragraph. The impact on destruction of 26 archaeological sites was indicated. We believe evaluation of these sites should be made to determine their importance before cultural resource impacts can be determined.

Ⓣ Page 4-3. Mitigation measure No. 10 says that a Federal agency will provide a fence around the tailings ponds to keep animals from the toxic chemicals. Fencing these hazards must be accomplished before the hazard develops and should be an Alumet Company responsibility.

Page 8-13. From the standpoint of the long-term impacts on the environment, the alternative power source (geothermal) seems the most desirable. With the alternative power source, the impacts upon air quality would be significantly reduced over the life of the project. For regional and State planners, this should be a substantial consideration when attempting to forecast or judge what pressures the continued development of other resources in the region may place upon that region's air quality. Perhaps most importantly, the statement on page 8-28 claims that with alternative energy source, "The availability of additional electrical energy would enable the city of Milford to serve the needs of the increased population and could also provide a base for the growth of other industries not directly related to alunite."

Page 8-35, Alternative plantsite 1. From the information presented, this alternative seems on balance to have less overall impacts than the proposed site. The tradeoffs seem to be less degradation of air quality and the natural setting, accompanied by a minimal increase (less than 200 acres) in disturbed vegetation.

RESPONSE

25. Bureau of Reclamation

A. Pollution of the ground water by seepage from the tailings ponds is discussed on pages 3-28, 3-30, and 3-31 of the draft statement. Projections on the potential impacts of seepage from the tailings ponds based on available information are presented in the draft. Determination cannot be made from your general comment where the analysis is deficient.

The material in the waste rock pile would be composed of solid rock material with the same physical and chemical characteristics as the rock in the surrounding terrain. Since this rock is highly insoluble, it is reasonable to expect that the surface runoff and water percolating through the waste rock would have essentially the same quality as water from the surrounding undisturbed terrain.

B. Concur. Projected seepage loss from the tailings ponds is discussed on pages 3-28, 3-30, and 3-31 of the draft statement.

C. It is possible that seepage losses could exceed the projections in the draft statement. However, all available data were used in the estimates and without specific criticism of the data and assumptions, revisions cannot be made to the projected seepage loss figures.

D. Concur. This figure describing the quality of the seepage water has been added to the final statement.

E. As has been mentioned in the previous comments and responses, it is certainly possible the effects of seepage from the tailings ponds on the quality of ground water has been understated. However, since you question our analysis and assumptions but provide no additional data, changes have not been made to our projections in the draft. It should be noted that a ground water monitoring program is proposed and described on page 1-82 of the draft statement, and if significant problems were to develop, the State of Utah could require the applicant to line tailings ponds with an impervious material.

F. The applicant would have no discretion in compliance with state and federal occupational health and safety standards. The standards are set at concentration levels and exposure periods which would preclude health problems for employees.

G. The applicant filed for and was granted the use of approximately 32,600 acre-feet of water before definite water requirements for the proposed action had been determined. As stated on page 1-15 of the draft statement, the applicant does have plans for additional alunite mining since the proposed lease area is estimated to have enough alunite ore for 100 years. However, prior to expansion or extension of the proposed action evaluated in the draft statement, additional environmental analyses would be required.

H. A definite source of funds for the paved access road has not been determined. The possibility of state or federal funds being used was mentioned only to identify potential funding which may become available under new programs.

I. As you state, cross drainage structures for railroads are usually designed for 25-year frequency floods. However, the company has proposed the installation of culverts to provide for maximum probable drainage and there is no environmental reason why they should not be allowed to provide better flood protection for their facilities.

J. The monitoring program described beginning on page 1-82 of the draft statement would supply information to the appropriate state and federal agencies responsible for enforcement of air and water quality regulations. A statement explaining the disposition of the information collected from the monitoring program has been added to the final statement.

K. Figure 2-10 shows location of data sources used to develop information presented in Chapter 2. The location of the proposed monitoring wells is discussed on pages 1-83 and 1-84 of the draft statement.

L. As the draft statement points out, there is little information on the value of the archaeological sites. However, in the section on mitigating measures on pages 4-2 and 4-3, you will note that the applicant would be required to survey the area to be disturbed by project components. Cultural resources identified would be evaluated for eligibility for nomination to the National Register or salvage and testing as required by Executive Order 11593. The coordination efforts with the Utah State Historic Preservation Officer are documented on page 9-5 of the draft statement. As a result of this coordination, revisions have been made in the final statement to provide for more specific actions to protect cultural resources.

M. The figures on page 2-70 refer to the regional area defined on figure 2-19. The hunting use figures on page 2-79 provide more specific information on the actual project site.

N. This statement is based on information from other processing plants and large power plants. No documented impacts to climate from the operation of these plants is known to us.

O. The pollution levels established for Class III air quality standards are low enough to preclude any secondary impacts to vegetation and animals, including humans. As stated in the draft statement, the project would meet Class II standards (which allow even less pollution) except in a small area of high terrain. The potential effects of exceeding Class II standards on this small area are discussed on page 3-24 of the draft statement. It should be noted that the plant site has been moved further from the high terrain in the final statement to ensure compliance with Class III standards.

P. A statement discussing the potential impacts of water percolating through the waste rock pile has been added to the final statement. The waste rock pile would not be revegetated and the impacts associated with this permanent loss of vegetation on 175 acres are discussed in the sections on vegetation, wildlife, soil, aesthetics, and land use of the draft statement.

Q. The anticipated increase in sewage loads is discussed on page 3-29. Potential impacts associated with this increased sewage are discussed on pages 3-32 and 3-33 of the draft statement. The problems associated with inadequate water and sewage treatment facilities are discussed in the socioeconomic section on pages 3-79 and 3-80 of the draft statement. The analysis of impacts certainly considers the "boom town" situation that would be expected to occur if the proposed project is approved. The rapid population growth and the need for expanded municipal services are the bases for the impact analysis in the socioeconomic section.

R. There are very little data to justify conclusions on impacts to dislocated animals and this situation is summarized on page 3-48 of the draft statement.

S. Specific mitigating measures have been added to Chapter 4 of the final statement to provide for additional evaluation and salvage of these sites.

T. The text has been changed to indicate that the applicant would construct and maintain the fence around the tailings ponds.

(26)

United States Department of the Interior
FISH AND WILDLIFE SERVICE
AREA OFFICE COLORADO–UTAH
1426 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138

In Reply Refer To (ES)

November 23, 1976

Memorandum

To: Director
Bureau of Land Management
Washington, D.C.

From: Area Manager
Fish and Wildlife Service
Salt Lake City, Utah

Subject: Review of Draft Environmental Impact Statement
Alunite Mining and Processing Plant, Beaver County,
Utah (No control number)

We have reviewed the above subject statement, as requested via memorandum, dated October 20, 1976, in regards to fish and wildlife concerns.

(A) Our only comment pertains to Chapter 3, The Probable Environmental Impacts of the Proposed Action - Page 3-49. "We note that paragraph 2, page 63 refers to the peregrine falcon as being a "Threatened and Endangered Species." The peregrine falcon is classified as endangered, the most restrictive of the classifications under the Endangered Species Act. We suggest dropping the words "threatened and" in this sentence.

Aside from this minor issue, we believe the statement covers those impacts regarding fish and wildlife concerns.

Robt H Shields

RESPONSE

26. Fish and Wildlife Service. **Concur. The text has been changed.**

27

United States Department of the Interior

BUREAU OF OUTDOOR RECREATION
WASHINGTON, D.C. 20240

IN REPLY REFER TO:
DES-76/43

DEC 2 1976

Memorandum

To: Director, Bureau of Land Management

From: Director, Bureau of Outdoor Recreation

Subject: Review of draft environmental statement for proposed Alunite Project, Beaver County, Utah

This is in accordance with Mr. Edwards' October 20, 1976, memorandum requesting the review of the document noted above.

We have reviewed the subject draft statement and find that it adequately assesses the impacts of the proposed project on recreation resources. We note, however, that firm commitments to implement mitigative measures necessitated by the increased use that will occur at nearby state and local recreation areas have not been made. For example, the increased use of Minersville Reservoir has been recognized (page 3-57) and control measures suggested (pp. 3-58,59 & 5-21), but a commitment has not been made to use those measures.

Fred J Jones
For John Crutcher

RESPONSE

27. Bureau of Outdoor Recreation. **No response required.**

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UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

December 2, 1976

Mr. Curt Berklund, Director
Bureau of Land Management
Department of the Interior
Washington, D. C. 20240

Dear Mr. Berklund:

This is in reference to your draft environmental impact statement entitled "Alunite." The enclosed comments from the National Oceanic and Atmospheric Administration (NOAA) are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving four (4) copies of the final statement.

Sincerely,

Sidney R Galler
Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure: Memo from NOAA, Environmental Research Laboratories

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES
Silver Spring, Maryland 20910

NOV 2 6 1976

November 24, 1976

TO: Director, Office of Ecology
and Environmental Conservation

FROM: Isaac Van der Hoven
Air Resources Labs.

SUBJECT: Comments on BLM DEIS #7610.37
Alunite Project, Utah

(A) With regard to the atmospheric diffusion models used in the report, it is not necessarily true that the C9M3D model is conservative (see statement, bottom of page 3-15). For the 3-hr average concentration, the use of sector-averages is non-conservative. Whether or not the impingement assumption is conservative or not is still to be extensively validated. The Huntington Canyon tracer test results and the Navajo Generating Station studies show impingement of plumes on high terrain. Also, in the case of Huntington Canyon, greater dilution was experienced (over that which would have been inferred from temperature rates in the vertical) because of mechanical turbulence caused by the terrain.

(B) It is difficult to assess the calculations of the Intera model since none of the assumptions and parameter input values are discussed.

(C) From the discussion on the air quality computations, I would infer that a real problem exists in exceeding 3- and 24- hour pollutant standards unless greater emission abatement is considered.

RESPONSE

28. U.S. Department of Commerce

A. Sector-averaging for 3-hour average concentrations using the C9M3D model tends to counteract any possible conservative features due to terrain. There has not been enough validation under similar circumstances to make a definite statement on the C9M3D model for 3-hour averages. The discussion on page 3-15 which states that the C9M3D model may be conservative has been deleted from the final statement.

B. The basic meteorological input parameters used in the INTERA model are given on page 3-13. The INTERA model solves the basic hydrodynamic equations to determine the wind field and then calculates diffusion using a numerical method. A more detailed discussion of the assumptions and methodology would be outside the scope of this environmental statement. For more details, see: A. Settar and R.B. Lantz, "A Turbulent Flow Model For Use in Numerical Evaluation of Air Quality", paper presented at the 25th Annual Technical Meeting of the Petroleum Society of CIM, Calgary, Alberta, May 7-10, 1974.

Since the INTERA model was not used for calculations associated with the new proposed plant site, this model will not be considered in the final statement.

C. The emission rates used to calculate these concentrations are already based on the best available control technology. Therefore, no further emission abatement is possible. Because of the problem in meeting the air quality standards, the applicant was forced to move the plant site about 1.5 miles further away from the mountains. At the new location, there would be no difficulty meeting the federal ambient air quality standards, but Class II standards under the Prevention of Significant Deterioration Regulations would still not be met. The State of Utah has initiated action to reclassify the area from Class II to Class III.

29

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
PHOENIX AREA OFFICE
P.O. Box 7007
Phoenix, Arizona 85011

IN REPLY REFER TO:
Real Prop. Mgmt.
300.1 - General

November 29, 1976

Memorandum

To: Bureau of Land Management, Washington, D.C. 20240

From: Area Director

Subject: Review of Draft Environmental Impact Statement for Proposed Alunite Project

Notice of Negative Response

The subject environmental document has been reviewed by this office.

It has been determined that the proposed action will have no significant effect on Indian lands, resources, or other interests.

ASSISTANT Area Director

RECEIVED
DEC 2 1976
DIVISION OF MINERALS
ENVIRONMENTAL ASSESSMENT

RESPONSE

29. Bureau of Indian Affairs. No response required.

(30)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80203

DEC 9 1976

Ref: 8W-EE
D-BLM-J67000-UT

Mr. William G. Leavell
Associate State Director
Bureau of Land Management
Utah State Office
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. Leavell:

The Region VIII office of the Environmental Protection Agency has reviewed the draft environmental impact statement for the proposed Alunite Project, Beaver County, Utah. The following comments reflect the areas of concern to EPA regarding this proposal.

Air Quality Impacts

Differences in modeling estimates remain a problem. The subjective conclusion reached by BLM that INTERCOMP's Intera model is more realistic for complex terrain than the EPA model is not substantiated. A reliable model estimate for short-term concentrations must represent the upper end of observable concentrations, since current short-term air quality standards are not to be exceeded more than once a year. See our detailed attached comments regarding this issue. Our staff will hold a series of meetings with BLM, INTERCOMP, and Alumet to resolve these differences.

(A) Using EPA's Valley Model, both EPA and the State of Utah agree that controls on the proposed plant are not sufficient to meet Class II PSD standards or ambient standards. Therefore, a permit for construction could not be issued at this time. However, it is probable that since the State of Utah will submit a request to EPA requesting Class III designation (i.e., for National Ambient Air Quality Standards) for Beaver County, a PSD permit for Alunite will not be issued by EPA. In that case, the remaining problems include model verification and meeting the secondary national ambient air quality standards (NAAQS). EPA's Valley Model, C9M3D, indicates potential violations of the NAAQS standards in the high terrain to the southwest. It may be necessary for Alumet to relocate the plant site further away (approximately 2-3 Kilometers from this high terrain) in order to avoid such potential violations of standards. The conclusion of EPA's and Utah State Division of Health's air quality permit procedures will follow in a separate report.

(B) Regarding fugitive dust generated on the plant site, EPA is pleased to see the requirement to water unpaved roads and to control off-road vehicle use. However, as the background air quality data indicate, there are already violations of the short-term 24-hour NAAQS particulate standards due to windblown dust -- 170 ug/m^3 versus the 150 ug/m^3 standard. EPA suspects that, to some degree, such conditions are aggrevated by man-caused activities, including over-grazing, off-road vehicle use and unpaved roads. Therefore, because this project will introduce another source of particulates to the area, EPA recommends that BLM examine its management of the natural resource lands surrounding the area to determine if measures such as reducing grazing, planting additional grasses, or additional restrictions of off-road vehicle use could further reduce the fugitive dust problem.

(C) As indicated in our comments on the preliminary EIS, the State of Utah will require under the New Source Performance Standards that gaseous and particulate flourides be included in the ambient air quality monitoring program. The details of such monitoring should be indicated in the final EIS.

Radiation and Cadmium

Since our review of the preliminary draft EIS in August, 1976, we have become aware of two potential health problems associated with the processing and use of Idaho phosphate ore. These include the potential radiation from the decay of the radioactive elements in this ore and the potential concentration of cadmium in food products produced from soils subject to long-term use of the fertilizer end product.

(D) As indicated in the draft EIS prepared by USGS et al. for the Development of Phosphate Resources in Southeastern Idaho (May, 1976), the uranium content of these ores is relatively high, averaging 90 ppm. Therefore, the final EIS should provide a complete evaluation of the radiological impact due to uranium decay elements. Recent work done by the EPA Las Vegas Environmental Research Laboratory indicates that, while most of the volatile radionuclides (Po 210 and Pb 210) are driven off during the calcining process, a certain percentage of the uranium, thorium, radium, and associated daughter products, all of which are radioactive, will end up in the gypsum tailings pond. The reclamation of this property by conventional methods of 6-12 inches of cover preceded by contouring and followed by vegetation will not significantly mitigate the potential radiation hazard. Radon gas will emanate through the cover, so that in the area surrounding the tailings pile, higher than natural levels of radon-222 and associated daughter products may exist. The level of radon-222 and daughters is a function of the surface area and depth of the tailings pile and of the content of the uranium in the original ore. The resulting health effects of this

D phenomenon are magnified when other activities exist or are proposed in close proximity to the tailings area. This problem, as well as the direct radiation problem, is delineated in the EPA Office of Radiation Publication, "Potential Radiological Impact of Airborne Releases and Direct Gamma Radiation to Individuals Living near Inactive Uranium Mill Tailings Piles" (copy enclosed). Based on information resulting from EPA-sponsored studies, we believe that Alumet should develop a radiological monitoring program to assure that no detrimental radiological impacts occur. The program should include sampling of radioactivity in the ground water monitoring wells, water runoff from mined areas, and ambient air sampling at critical locations (such as employee work areas). Sampling should occur on a periodic basis.

E While the EIS does not indicate any subsequent use is to be made of the gypsum tailings, it should be noted that radiological contamination of these tailings could preclude their use for construction materials or use of the pile for residential housing.

F Cadmium

The USGS-prepared EIS on the Development of Phosphate Resources in Southeastern Idaho also indicates the cadmium content of these ores is relatively high, also averaging 90 ppm with maximum concentrations of up to 800 ppm. The report, entitled "Plant Uptake of Cadmium from Phosphate Fertilizer" (copy enclosed), prepared by EPA's Corvallis Environmental Research Laboratory concludes that the uptake of cadmium from phosphatic fertilizers by radish, lettuce, and peas is a linear function of the cadmium concentration in the soil. The report recommends that the uptake of cadmium from phosphate fertilizers is high enough to warrant further investigation, particularly in acidic and calcareous silt loam soils and in relation to long-term effects of continuous use of high cadmium fertilizers.

There is no federal regulation regarding maximum cadmium concentration in fertilizers; however, the Food and Drug Administration has established maximum cadmium concentrations for the interstate shipment of food products. If EPA develops procedures under the soon-to-be-enacted Toxic Substances Act (January 1, 1977) to regulate the cadmium content of fertilizers, notice will be provided in the Federal Register. Until this problem can be further researched by EPA, EPA recommends the company initiate its own research program to define the problem of cadmium uptake in plants associated with the long-term use of their end product. Such research is highly recommended, both to protect the public health and in order for Alumet to protect its large investment. EPA also recommends that discussion of this issue be included in the final EIS with the following information:

F

1. Estimate of average and maximum cadmium concentration in the original ore, fate of cadmium through the calcining and milling process, and estimates of the cadmium concentration in the end product.

2. Expected locational use of the produced fertilizer and the soil types there.

3. If Alumet will conduct a research program on this topic, a preliminary outline of this research program could be included in the final EIS.

G **Tailings Pond Design**

Another area of major concern is the method of tailings disposal. The EIS indicates that the silica sand tailings pond will be raised in three lifts to 120 feet and the gypsum tailings pond in two lifts to 80 feet. If this additional elevation is to be achieved by upstream lifting (which means that the new lifts are supported by waste tailings deposited partially on the initial reservoir), this procedure is unacceptable. Since the tailings disposal system is designed for no discharge, the upstream lifting procedure must be abandoned in favor of the downstream lifting procedure, whereby the new lifts are not supported on the unconsolidated tailings. This position is supported by the Army Corps of Engineers, since they conclude the structural integrity cannot be assured by the upstream lifting procedure (letter dated October 2, 1974, from the Office of the Chief of Engineers attached).

H In a related matter, EPA suggests that consideration be given to lining with an impermeable barrier the two 30-acre reclaim ponds, not just compaction of these areas. This would assure no discharges to the ground water system.

I Socio-Economic Impacts

The amount of coordination between BLM, state and local officials to date has been commendable; we hope this effort will continue as the specifics for the Alunite project are developed. In fact, some of the agreements reached between the company and Beaver County officials are not included in the EIS and could be in the final EIS. EPA would particularly want to see the following developed if possible:

1. Company assistance for commuting employees to reduce air pollution and energy use.

Ⓘ 2. **Prepayment of taxes to offset lead time necessary to construct community facilities, particularly to handle the expected sewage treatment problems of Minersville and Milford.** (As indicated in our comments on the preliminary EIS, the municipal grant program for the construction of sewage treatment facilities for these communities, administered by EPA and the State of Utah, may not have sufficient funds to cover these expenses due to other priorities.)

According to the procedures EPA has adopted to rate the adequacy of environmental impact statements, the draft EIS for the Alunite Project will be listed in the Federal Register in Category ER-2. This means EPA has environmental reservations regarding this action as proposed and requests additional information. This is necessary until the problems with air pollution control, plant siting, radiation, cadmium, and tailings dam design can be reconciled. Please send five copies of the final EIS to this office when completed.

Sincerely yours,

John A. Green
Regional Administrator

Enclosures 2

Detailed Comments Regarding the Validity of the EPA Valley Model

Ⓙ Page 3-9, 2nd paragraph The statement is made that the EPA Valley Model (C9M3D) is only appropriate for monthly, seasonal, or annual averages. This statement is incorrect, because the EPA Valley Model has a short-term mode of operation specifically designed to make 24-hour concentration estimates.

Ⓚ Page 3-10, 2nd paragraph A statement is made that Greiner Environmental Sciences, Inc., (1976) used the PTMTP, modified to take into account variable topography. No explanation is given on what modifications were made. A description of the modifications should be included.

Ⓛ Page 3-10, 3rd paragraph A statement is made that the Intera Model is more realistic than either C9M3D or PTMTP models. This is a subjective statement made by those who developed the model, and is a judgment decision which may only be true for some particular meteorological conditons and complex terrain features. In a recent EPA Report (EPA-450/3-75-059, June, 1975, "Evaluation of selected air pollution dispersion models applicable to complex terrain"), the following statement is made concerning the Intera model:

> Also, EPA does not completely agree with INTERCOMP's interpretation of the NOAA's Huntington Canyon study. A case may be made that the results of the study indicate that the basic Gaussian model provides more realistic estimates of the peak 1-hour concentrations in this instance than either the EPA terrain or the INTERCOMP models.
>
> Further, current short-term air quality standards (24-hour period or less) are not to be exceeded more than once per year. Hence, if modeling results are to be used directly in source-control decision, a reliable model estimate must represent the near-upper envelope of observable concentrations. However, INTERCOMP interprets a reliable estimate as one which best fits an average of observed data. This interpretation may lead to estimates of concentrations that are incompatible with the definition of short-term standards. Thus, a degree of control based on INTERCOMP's interpretation of a reliable model estimate may not adequately protect the quality of the air.

Ⓛ **Also, near the bottom of page 3-10, the C9M3D model is compared with measurements at the Navajo Power Plant. It is reported that C9M3D overestimated by a factor of 2. To this statement one should add that in some cases the model underpredicted. Also, Intera reported that comparisons between the Intera model and C9M3D with measured data at Navajo showed very similar results, but they conclude that C9M3D predicted concentrations close to measured values, but for the wrong reason; referring to the sector averaging procedures of C9M3D.**

Ⓜ Page 3-12, last line Additional explanation is needed on what is meant by the statement, "the C9M3D model allows the plume to impinge directly on the hillside."

Ⓝ Page 3-13, two-thirds down the page Concentration estimates are reported to have been made by Greiner using PTMTP models. These results are very similar to the Intera estimates. The techniques used by Greiner to modify PTMTP to allow for terrain must be explained. If they have made the calculations as if the terrain were flat, then their results and Intera's results, which are similar, are questionable.

Ⓞ Page 3-14, first paragraph Reference is made to estimates made using two different methodologies. The first refers to a method developed by the Tennessee Valley Authority and results in fairly high concentrations. The second methodology refers to a determination which uses periods of persistent wind and stability. Neither of these techniques are described in sufficient detail for the reader to make judgments on their validity.

Ⓟ Page 3-15, 2nd paragraph A statement is made indicating surprise that the Intera model and PTMTP agree well. This isn't surprising, because the dispersion rates in the Intera model have been calibrated over flat terrain and found to agree well with Gaussian models over flat terrain. The PTMTP model is Gaussian and applicable to flat terrain estimates.

Ⓠ Page 5-4, last paragraph It is stated that the high values calculated by the C9M3D model are because of impingement of the plume against the terrain. This statement should be reworded, because all models, which allow for terrain influence, have some degree of plume impingement or the concentration would be estimated to be zero.

RESPONSE

30. Environmental Protection Agency

A. It is apparent that in order for the proposed project to meet secondary ambient air quality standards (Class III), the processing plant would have to be moved further from the high terrain. This change in plant location has been incorporated into the final statement. As you point out, the State of Utah's request to change the designation of the area from Class II to Class III would have to be approved by EPA before the state could authorize the project under the Prevention of Significant Deterioration Regulations. These changes in required state and federal actions have been added to Chapter 1 of the final statement.

B. It is possible that man-caused activities such as overgrazing and use of unpaved roads contribute significantly to the periodic background particulate levels at the project site. Off-road vehicle use is negligible at the present time. Other sources of particulates are large areas in the Escalante Desert which do not support vegetation because of high alkalinity (hardpans) and the farming activity in the Beryl-Enterprise area. There is absolutely no data to determine the source of particulates, but field observations indicate that the hardpans and farming areas contribute most of the background particulates. As you suggest, BLM should examine the management of surrounding natural resource lands to determine if measures can be implemented to reduce particulate sources. Since BLM has no control over the use of existing roads, farming on private land, or dust from naturally occuring hardpans, the only possibility would be adjustments in grazing use to increase vegetation cover. Precipitation and soil conditions in the dust-producing areas are such that artificial revegetation has almost no chance of success. Any improvement in vegetation cover from adjustments in grazing would occur over a considerable period of time. Fenced enclosures constructed by the CCCs in Wah Wah Valley in the 1930s have essentially the same vegetation composition and density as areas outside the enclosures which have been grazed by livestock. Assuming that the uncontrolled grazing of livestock that occurred prior to the passage of the Taylor Grazing Act significantly reduced vegetation cover and soil stability, it is apparent that even complete removal of grazing would do little to reduce particulate levels during the life of the proposed alunite project.

C. This requirement has been added to the monitoring section in Chapter 1 of the final statement.

D. The applicant has stated a willingness to design a program to monitor potential environmental and health hazards. The sampling of radioactivity in ground water has been added to the proposed monitoring program. In addition, the applicant has committed to monitor the gypsum tailings pond to establish radiation levels and to work with EPA and the State of Utah to implement appropriate safety design factors to keep radiation exposure to plant workers within legal limits. All work areas would be treated as specified by the Utah Division of Health. Since the alunite mine is not a source for radionuclides, runoff water from the mine would not be sampled for radioactivity.

E. The applicant is aware of the radiological contamination of the gypsum tailings and has no plans to allow their use in construction materials. Because of possible legal problems, the applicant intends to provide for permanent fencing of the gypsum tailings pond area.

F. Trace element composition of the phosphate rock was discussed in the environmental statement for phosphate development in southeastern Idaho, where EPA raised a similar concern. It is recognized that this phosphate has both cadmium and selenium concentrations, sometimes exceeding 100 times that of average crustal distribution. According to EPA, their Region X staff has been studying the problem since 1974 and is concerned about possible long-term implications in the human food chain. At such time as the proposed project is in operation, Alumet would cooperate with the investigators.

G. According to the applicant, the design of the tailings ponds was a preliminary design based on the nature of the hydrologic and geotechnical environment. At such time that Alumet requests a permit to construct said ponds, the Company would adhere to all applicable rules and standards. Should the rules and standards prohibit the proposed design, final design will so reflect.

H. Based on the relative insignificance of potential impacts to ground water resulting from seepage from the tailings ponds, there does not appear to be any justification for lining the water reclaim ponds. These ponds would be much smaller and the concentration of chemical compounds and other contaminants would be much lower than the tailings ponds.

I. The applicant has indicated its willingness to assist in the transportation of workers from Milford to the proposed project site. However, no definite commitments have been made and specific information on just what the company would provide is not available. In the absence of a definite commitment, the analysis in this environmental statement must assume that workers would provide their own transportation.

According to the applicant, they are unable to determine their ability to prepay taxes until after all permits and approvals are in hand.

J. This statement will be deleted in the final statement since the sector averaging should also be appropriate for 24-hour calculations. The C9M3D model was used to calculate 24-hour concentrations as well as 3-hour concentrations.

K. According to Griener Environmental Sciences, Inc, they modified the PTMTP to take into account variable topography. However, since BLM has never been able to determine specifically how the model was modified, it should be assumed the results apply only to flat terrain or else discard the results entirely. Since this model was only run for the original plant location, the results will not be presented in the final statement.

L. The INTERA model allows for a variable wind field which may be more realistic than the constant wind field assumed in the C9M3D model. However, because of the special difficulties involved in the numerical selection of equations of motion and diffusion, the results of the INTERA model may not necessarily be more realistic than those of the C9M3D model. The peculiar condition at the proposed plant site which has terrain rising abruptly within a mile from the source, causes the unusually large discrepancy between the two models. The position presented in the draft statement is that in the case of abruptly rising terrain, the C9M3D model may overestimate concentrations and the INTERA model most probably underestimated concentrations. The real value is probably somewhere between these two estimates. A report submitted to BLM by the Desert Research Institute has shown that with the plant moved 1 mile further away from the mountains, the discrepancy between the INTERA model and C9M3D model was reduced from a factor of more than 15 to a factor of about 3.

M. This sentence has been changed in the final statement to "the C9M3D model allows the plume center line to approach to within 10 meters (vertical distance) of the terrain surface".

N. The BLM has never received a complete explanation from Greiner as to how the PTMTP model was modified to take terrain into account. The results of the model cannot, therefore, be compared with any other model.

In view of this situation and since the plant site has been changed, the PTMTP results will not be considered in the final statement.

O. The two methodologies have been changed somewhat from those presented in the draft statement. This is because the additional modeling work done for the proposed alunite project was not completed at the time the draft statement was published. One method employed the C9M3D model with a wind speed of 3.5 meters per second and E stability with wind direction constant in a given sector for 6 hours in a 24-hour period. The 24-hour average was determined by multiplying by 0.25. The second method of calculating maximum 24-hour concentrations consisted of using the C9M3D model with actual observed hourly data as input with the 24-hour period chosen having maximum persistence of wind direction and stability.

The TVA ratios developed by Montgomery and Coleman (1975) were not applied to C9M3D calculations in the final analysis because that model uses sector averaging. The TVA ratios were applied to the results of the INTERA model to estimate 24-hour average concentrations.

P. It is not known what assumptions went into the PTMTP model. At the time the section was written, it was thought that Griener modified the PTMTP model to include topography. However, the modification was never explained completely and the PTMTP results will, therefore, not be included in the final statement.

Q. The statement that the C9M3D model may overpredict in this case will be deleted in the final statement. Only the C9M3D model has been used to estimate concentrations for the new plant site and there is no basis for comparison with other models on tracer studies. In addition, with the new plant site, the plume impaction would occur at greater distances from the source which would reduce unusually high concentrations.

(31)

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
REGIONAL OFFICE
EXECUTIVE TOWER - 1405 CURTIS STREET
DENVER, COLORADO 80202

REGION VIII

December 14, 1976

IN REPLY REFER TO:
8DE

Mr. J. K. Giles
Environmental Project Officer
Bureau of Land Management
Post Office Box 729
Cedar City, Utah 84620

Dear Mr. Giles:

This is in response to the Bureau of Land Management's Draft Environmental Impact Statement (EIS) on the proposed Alunite Project (DES 76-43) in the Five County Association of Governments area (southwestern Utah).

The principal concerns of the Department of Housing and Urban Development (HUD) are the effect of a proposed action on the urban environment, the effect of the environment on the action, most particularly the impact on housing affecting low-income families and senior citizens, and the consistency of such actions with the comprehensive planning for the area.

The housing market overall is sparse and weak in Milford, and although stated as stronger in Beaver, there is no identification of specific projected construction to absorb the large number of new residents who will be mine employment related. The draft statement suggests up to 1,800 construction employees followed by 1,000 operational employees, with maintenance of a temporary construction camp for about 900 workers at the project site.

Ⓐ Mitigating measures for relieving the housing problems are so vaguely addressed that they are negligible. The temporary camp for 900 workers will require housing, water and sewers, social services, schools, police and fire protection, none of which have been properly addressed. Ⓑ Nor have the peripheral effects on the housing market in the existing communities been discussed. Ⓒ A particular concern of HUD's is the out-pricing of low-income families and fixed income elderly residents who will be most severely impacted in competition for housing and services. The area under consideration is identified generally as having less

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than the state median income level. For instance, you identify Beaver county as having a nineteen percent mean annual income of $1,648, many families on public assistance and a high ratio of elderly. The desparity in mine related wages vis-a-vis the existing low wage scales in this area will further affect the cost escalation for services and lack of alternative housing. Ⓓ **Inadequate educational facilities, public safety, and public health are identified, with no specific solutions for ameliorating these problems.**

Comprehensive planning is vague. The draft statement accurately says that there is no state land use plan (page 2114), that Beaver county adopted a plan prior to the Alunite Project proposal (which makes the plan obsolete), that Iron county has not amended its plan for growth facilitation and that only the town of Milford has amended some plans to consider anticipated growth resulting from the project under consideration.

Ⓔ Our Department has several concerns relative to the ground water aquifers of the Wah Wah Valley and Milford area. If these aquifers are connected, a rapid withdrawal of water from the Wah Wah Valley might affect both the quality and quantity of the Milford might leave this community with a water shortage. Ⓕ Another serious question which has not been addressed is whether, in a project of this magnitude, the removal and deposit elsewhere of materials mentioned in the draft EIS, will affect the depth of the ground water.

Ⓖ The draft statement does not indicate required consultation with the State Historic Preservation Officer in determining eligibility or effect (if necessary) as required by Procedures for Protection of Historic Properties (36 CFR 800). Cultural resources (historical and archeological) should be more completely identified prior to the final EIS.

Ⓗ The final EIS should consider more thoroughly not only the effect of the proposal on the human environment, but the affect of the environment on the project, i.e., air quality, emissions, water levels and runoffs. Ⓘ The area, especially Milford, is identified as likely to experience a "boom town situation", with a possible growth increase of 30% annually for the first few years, and "all of the services and facilities which support the community would be pressured..." You also identified a two to four year lag period, but, again, ignore the effect of lack of these support services during that period.

The overwhelming socio-economic and physical impact caused by the high proportion of infusion of new people and change in values and life styles, coupled with severe housing and service shortages has not been specifically enough anticipated in your consideration of mitigations.

Ⓙ **In conclusion, your statement identifies numerous significant adverse impacts, yet provides little or no mitigation for the impacts. In view of factors as presented in your statement, to incorporate the Draft EIS in your decision making process would, in our opinion, necessitate a decision of "no project."**

HUD strongly recommends that you make major revisions to your statement, and if in fact these impacts cannot be mitigated, the undertaking of this project would be inadvisable.

Sincerely,

Robert J. Matuschek

Robert J. Matuschek
Assistant Regional Administrator
Community Planning and Development

RESPONSE

31. Department of Housing and Urban Development

A. Alumet has proposed a temporary camp for workers that would provide housing, water and sewer services, and electricity. There would be no need for schools since the camp would only house workers and not their families. Social services, police and fire protection, would have to be provided by nearby communities and the county. These mitigating measures are not addressed in any greater detail than the applicant proposed since BLM has limited authority to enforce socioeconomic mitigating measures.

B. It is felt that impacts on housing and the housing market have been adequately addressed. Discussions are on pages 3-82 to 3-84 and pages 3-87 to 3-88 in the draft statement.

C. Increased local wages would probably occur as a result of competition for labor at higher wages paid at the project site. Increased prices of housing, goods, and services would occur as a result of increased wages and competition for initially scarce items. Page 3-87 states that there would be adverse impacts to residents whose incomes did not increase. In addition, plans to mitigate impacts to primary health care have been determined and will be included in the final statement.

D. Mitigating measures for education and public safety are described briefly on page 4-5 of the draft statement. Since BLM has limited authority to enforce socioeconomic mitigating measures, these consist of state and local plans for mitigation. Appendix D in the draft statement is a copy of all state and local plans for mitigation.

E. The boundaries of the Wah Wah Valley and Milford area ground water basins are shown on page 2-33 (figure 2-10) of the draft statement. These boundaries were defined as a result of hydrologic studies of Wah Wah Valley and the Milford area. According to information from these studies (cited on page 2-31 of the draft statement), the two ground water basins are not related and a withdrawal of water from Wah Wah Valley would not affect water levels in the Milford area.

F. From the information in your comment, determination could not be made regarding materials you are referring to. However, if your concern applies to the alunite mining operation, the hydrologic impacts are discussed on page 3-27 and 3-30 of the draft statement.

G. Consultation with the State Historic Preservation Officer is documented on page 9-5 of the draft statement. The cultural resources section has been revised to provide for complete survey, evaluation, and appropriate salvage of cultural resources prior to construction of the proposed project.

H. Without a specific example of a deficiency in the impact analysis for the proposed action on the human environment, it is not possible to respond to this comment. There seems to be no valid reason to evaluate the effect of the environment on the project since the primary purpose for an environmental statement is to evaluate the impacts that the proposed action would have on the environment.

I. The effect of a lack of support services in the Milford area for the first few years is discussed under "Quality of Life" in Chapter 3. This discussion can be found on pages 3-85 to 3-88 in the draft statement.

J. Chapter 4 of the draft statement lists and evaluates mitigating measures that are committed by either the applicant or federal and state agencies. The BLM manual for preparation of environmental statements requires that mitigating measures be feasible, committed and enforceable. At this point in the decision-making process, there is no way for local governments and private citizens to commit the funds and resources necessary to mitigate potential socioeconomic impacts. For this reason, these plans cannot be considered mitigating measures in an environmental statement and the impact analysis must present essentially all impacts as being unavoidable. The Beaver County Planning and Development Council has done considerable work in identifying potential impacts and making detailed plans to mitigate significant impacts if the project goes ahead as proposed. Even though these plans cannot be considered as mitigating measures in the environmental statement, the fact that plans are completed and, if implemented, would significantly reduce socioeconomic impacts would be considered by the decision-maker. The plans are discussed beginning on page 4-4 of the draft statement and described in more detail in appendix D.

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utah environment center
610 Judge Bldg., Salt Lake City, Utah·84111·533-0591

December 15, 1976

Mr. Paul Howard, State Director
Bureau of Land Management
University Club Building
Salt Lake City, Utah 84111

Dear Paul:

Attached please find comments to the draft Environment Impact Statement on the Alunite Project. Apologies are extended for the lateness of our comments, but we sincerely hope you are able to extract some helpfulness from them.

We wish to commend the BLM for the excellent work that went into preparing the DEIS and look forward to reviewing the final document soon.

Sincerely,

Jan Johnson

Jan Johnson
Executive Director

Enclosure

AIR QUALITY

The casual approach, and the glib language employed in describing the proposed projects' effect on air quality, merits much criticism.

Ⓐ Regarding particulate pollution, the term "natural dust" is used in describing the major source of particulate pollution in Wah Wah valley. Persons acquainted with the area may argue that high background dust levels due to overgrazing, indiscriminate ORV use, and operation of several strip mines, are not "natural dust".

Ⓑ What is startling however, is the conclusion reached in the DEIS concerning particulate effects on secondary AAQS.

The argument is made that since "natural dust" is occurring, Alunites' particulate emissions should be allowed to exceed secondary AAQS, since "natural dust" is largely to blame for the problem.

To discount an existing environmental component from the air quality equation, renders unrealistic results at best. At worst, this treatment of secondary AAQS throws open to question the need or relevance of having such a standard if it , in effect, is allowed to be violated.

ALTERNATIVE POWER SOURCE

Ⓒ It is the view of the U.E.C. that there is no reason to construct a 75MW coal fired power plant. This is an unwarranted, wasteful duplication of resources.

A 138 KV line could be installed to supply all electric needs of the Alunite operation, plus, supply expanded electrical capabilities for the Milford-Minersville communities.

This alternative is so simple and beneficial in terms of less pollution and greater economic benefit to the Milford-Minersville communities, that it amazes us that construction of a 75MW plant was even seriously considered.

MASS TRANSPORTATION

(D) Since its projected that 90% of the Alunite workforce will be making their homes in the Milford-Minersville area, mass transit of these workers could be feasibly accomplished.

Bussing of employees to work may be viewed as greatly mitigating the following projected adverse effects:

- Indiscriminate shooting of perching raptors.
- Less wear and tear of the highway surface, resulting in reduced maintenance costs.
- Reduce harassment to livestock or wildlife grazing in the area.
- Reduce potential for loss of life/economic loss due to collisions with livestock or wildlife.
- Reduce ORV use within proposed project area.
- Afford greater protection to archaeological and scientific resources within project area.
- Reduce rush hour congestion in the Milford-Minersville communities, increasing traffic safety for its residents.

For all of the above reasons, we urge the B.L.M. and the Alunite developers to consider and include this project component in the final EIS.

RECLAMATION OF LANDS

Should the proposed project be implemented, damage from construction and operating activities will certainly occur to the soils and vegetation of this fragile desert ecosystem.

Reclamation of damaged and/or disturbed soils is usually accomplished by waiting for natural vegetative succession to re-establish itself. For reclamation to be succesful, disturbed soils must be treated in such a way as to create optimum conditions for plant regenaration.

Bearing the above in mind, the following suggestions may be helpful:

- (E) Topsoil, wherever possible, should be salvaged for reclamation use. There is no need, for example, to bury many acres of it under a tailings pond.
- (F) Irrigation systems should be used to encourage initial plant growth in reclamation of these soils.
- (G) All waste rock from mining operations should be backfiled into the mine pit. This is more preferable, than dumping the waste rock into a canyon as proposed. What the DEIS calls a "small plateau" of waste rock, need not be created.

GENERAL COMMENTS

The proposed project has much to recommend it, chiefly, due to the pioneering nature of the process to be used and its positive effect in reducing our national dependence on foreign bauxite.

It should be noted that this alunite ore deposit in S.W. Utah, is considered to be one of a few major reserves of this ore within the U.S. Yearly production of 500,000 tons of alumina by the proposed project, will alleviate our dependency on foreign bauxite by a small percentage at best.

Thus, it becomes apparent that alunite is by no means a long term solution to the problem, but a minor remedy to existing situations. Conservation, and recycling of aluminum resources can have a much greater impact in alleviating this problem than alunite ever will. Moreover, this project is handicapped by high production costs, and its product will be at the mercy of fluctuating prices.

Unless each step is properly planned and provided for, serious problems will certainly develop along with its attendant ramifications impacting the immediate communities and the state.

Should the proposed project be implemented, the economic base of the Milford-Minersville communities should be developed and expanded to more effectively disassociate their economic dependence on alunite.

RESPONSE

32. Utah Environment Center

A. Concur. The term "natural dust" is not appropriate and has been changed to "background particulate levels" in the final statement.

B. The primary purpose of an environmental statement is to describe the existing environment in order to make an assessment of the potential environmental impacts of a proposed action. There was no intention to present any justification for the proposed action, but only to disclose the relationship between the existing environment and potential impacts. In the case of particulates, concentrations resulting from emissions were compared with background levels in an attempt to assess actual impacts rather than compliance with the federal regulations. An environmental statement is only one factor in the decision-making process. Compliance with existing laws and regulations is also a major factor in the decision-making process. It should be noted that the applicant has changed the plant site in the final statement, and this change will ensure that secondary ambient air quality standards would be met. In addition, the term "natural dust" has been changed to "background particulate levels" in the final statement.

C. This alternative source of electrical power was described and evaluated in the draft statement and will be considered in the decision-making process.

D. Mass transit of workers from the Milford-Minersville area is feasible and would significantly reduce impacts associated with increased vehicular traffic to the processing plant. However, there is no commitment by the applicant or local government agencies to provide mass transit and the analysis in this statement must assume that workers would travel to the plant site in private vehicles.

E. Concur; as specified in the draft statement on pages 4-2 and 4-6, this would be required on rights-of-way and material sites where the BLM has jurisdiction. However, in the case of the tailings ponds, the applicant would control this land if the project is approved and it is not possible to legally require stockpiling of topsoil from the tailings pond sites. The applicant has raised the possibility that topsoil would be stockpiled for use in reclamation of tailings ponds, but has not made a firm commitment.

F. The applicant has committed to the use of irrigation systems for restoration of disturbed areas. However, the situation on the tailings ponds is the same as described in the response above.

G. Requiring the applicant to dump all the waste rock into the mine pit when mining operations are completed would reduce the visual impacts of the proposed action. This measure was considered, and in view of the significance of the impacts to visual aesthetics, it does not appear to be feasible. The applicant would have to put approximately 71 million tons of waste rock into a pile over the 25-year project life to allow mining to proceed. When mining is completed, the entire pile would have to be moved back into the mine pit. This would create substantial economic hardships for the applicant since their proposed mining operation would have the capability to move only about 7.28 million tons of ore and waste rock a year.

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United States Department of the Interior

OFFICE OF THE SOLICITOR
SUITE 6201, FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138

Cedar City Utah RECD.

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DEC 21 1976

December 1976

Memorandum

To: District Manager, BLM, P.O. Box 729, Cedar City, Utah 84720

From: Regional Solicitor, Salt Lake City, Utah

Subject: Alunite Draft Environmental Impact Statement

The Regional Solicitor's Office has previously expressed its concern regarding the inadequate treatment given to the subjects of air quality and coal source in the Alunite Draft EIS. In view of some remaining uncertainties and the critical environmental impact that these two areas represent, this office feels it necessary to re-emphasize our specific concerns on this matter.

Air Quality

Within the Air Quality discussion there are two specific problem areas: First, the periodic high particulate count, and, second, the question of re-classification.

At 2-17, it is indicates that "high levels of particulates occur at times" apparently caused by high winds raising large quantities of dust. Various statements from BLM, and a recent conversation with Mr. Bill Wagner, have suggested that this periodically high particulate count might on occasion violate the Class II air quality standards.

Ⓐ Table 2-8 at 2-19 would indicate that there is no violation. Some uncertainty then, does exist as to whether the dust carried by frequent high winds, is presently, on occasion, in violation of the Class II standards. It is, therefore, recommended that the discussion be clarified so as to specifically address this critical issue.

Ⓑ With respect to the reclassification question, and related to the above issue, there has been no reference to the likelihood of a reclassification under the significant Deterioration Regulations (Federal Register Vol. 38, No. 235, Thursday, December 5, 1974). This issue is particularly significant in view of the aforementioned high particulate count. The air quality discussion must address the likelihood of the project region being downgraded to Class III.

Ⓒ As a related issue, we note with some concern the proximity of various national forests and parks. Fishlake National Forest is within 50 miles of the proposed project site as is Dixie National Forest, and Zion National Park is located within 75 miles. Should there be such a reclassification, and based on the high wind patterns, etc., what would be the assessed impact on these forests and parks? This issue has not, and should be, addressed.

Coal Source

Coal will provide most of the energy for the proposed project. The estimated annual requirement is between 800,000 and 1.1 million tons.

The EIS, referring to the coal source, states:

> Coal would be supplied from company-owned mines or purchased commercially. Since a definite coal source has not been identified, a separate environmental analysis may be required at the time actual development of a specific coal source is proposed. (draft EIS p. 1-81)

Ⓓ In view of the fact that coal will be the primary source of energy for the project, it is our opinion that to delay an indepth analysis of specific coal sources would be to characterize the entire EIS as premature.

If no single coal source has been selected, a minimal requirement would be to evaluate alternative sources of supply. An analysis is necessary as to whether or not a single coal source or a combination of suppliers can meet the annual fuel requirement. Furthermore, can any supplier or suppliers satisfy the initial 25-year project life? If not, how long? In view of an anticipated expansion to satisfy the coal requirement, what would be the environmental impact on these coal sources?

THOMAS O. PARKER
Regional Solicitor

By Reid W Neilson
REID W. NEILSON
Acting Regional Solicitor

DWJ:bt

cc: Regional Director, BR, UCR, SLCU

RESPONSE

33. Office of the Solicitor, U.S.D.I

A. The Prevention of Significant Deterioration regulations apply only to allowable incremental increases above background levels for new projects. The dust from existing sources contributes to background particulate levels and dust levels are occasionally high enough to exceed federal ambient secondary standards. The fugitive dust problem will be discussed more fully in the final statement.

B. Since the draft statement was published, the State Bureau of Air Quality has proposed a redesignation of a large portion of Utah to Class III, including the region around the proposed alunite complex. The proposal would requires approval by EPA after appropriate procedures have been followed. It is not known at this time if the proposal will be approved. Whether the alunite complex would be given permission by the State to begin construction depends on the outcome of this redesignation proposal.

C. Results from computer modeling reported on page 3-24 of the draft statement indicate that Class I standards would not be exceeded for distances greater than 10 miles from the proposed plant site.

D. See response to comment on coal source in letter from the National Park Service (letter number 24).

34

Scott M. Matheson
Governor

STATE OF UTAH
Office of the
STATE PLANNING COORDINATOR
118 State Capitol
Salt Lake City, Utah 84114
(801) 533-5246

James Edwin Kee
State Planning Coordinator

DEPT. OF THE INTERIOR
RECEIVED
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BUREAU OF LAND MANAGEMENT
CEDAR CITY, UTAH

January 28, 1977

Mr. Morgan Jensen
District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Dear Mr. Jensen:

As authorized and designated by the Governor and as the State Clearinghouse, I forward to you State comments on the Draft Environmental Impact Statement for the Alunite Project. These comments were prepared by the Environmental Coordinating Committee.

The State compliments the Bureau of Land Management for this document.

Sincerely,

James Edwin Kee
State Planning Coordinator

JEK/jn

Enclosures

cc: Don Cain

RESPONSE

34. **State Planning Coordinator.** **No response required.**

(35)

STATE OF UTAH–DEPARTMENT OF SOCIAL SERVICES

SCOTT M. MATHESON
Governor
ANTHONY W. MITCHELL, Ph.D.
Executive Director

DIVISION OF HEALTH
44 MEDICAL DRIVE
SALT LAKE CITY, UTAH 84113
AREA CODE 801

LYMAN J. OLSEN, M.D., M.P.H.
Director of Health

Board of Health
Air Conservation Committee
Health Facilities Council
Medical Examiner Committee
Nursing Home Advisory Council
Water Pollution Committee

Environmental Health Services Branch
72 East 4th South
Salt Lake City, Utah

533-6121

January 12, 1977

MEMORANDUM

TO: Chauncey Powis, Secretary
Environmental Coordinating Committee

FROM: Howard M. Hurst, Associate Director of Health
Environmental Health Services Branch

SUBJECT: Alunite Draft Environmental Impact Statement

Following our review of the above subject Statement as prepared by the United States Department of the Interior - Bureau of Land Management- we offer the following comment:

1. Page 1-8:

(A)

A. In addition to approval of plans and issuance of permits for air pollution control and solid waste disposal, the Division of Health will require plan approval for liquid waste disposal facilities (including sewage) & for domestic water facilities.

B. If construction camps or mess halls are contemplated, these must comply with existing regulations.

C. All plumbing must conform with provisions of the Utah Plumbing Code.

2. Air Pollution Control:

(B)

A. Tables 3-1, 3-2 & 5-1 indicate that lime scrubbers for the Acid Plant and the Potassium Sulfate Plant are to have an efficiency of 80% rather than 90%, which is achievable under present technology.

(C)

B. Ability of the proposed project to comply with air quality conservation requirements has not been reconciled to date because of a discrepancy in air modeling considerations. Further discussions between project personnel and our Bureau of Air Quality are contemplated for resolution of the problem.

3. Water Pollution Control:

(D)

A. Although the Draft indicates no probable impact on ground or surface waters it is felt that construction of the tailings ponds should be such as to minimize bottom seepage preferably to less than 1/4 inch per day.

(E)

B. Installation and periodic monitoring of test wells in the vicinity of the tailings ponds for such parameters as pH, total dissolved solids, sulfate, fluoride, aluminum and phosphorus would allow for early detection and control of significant chemical problems.

(F)

C. Plans for all sewage disposal facilities, whether temporary or permanent, must be reviewed and approved prior to construction thereof.

(G)

4. Domestic Water Supplies:

Plans for domestic water supply systems must be reviewed and approved prior to construction thereof.

5. Construction Camps:

(H)

A. Camps established incident to project construction are governed by existing sanitary regulations. Plans relating to such installations should therefore be submitted for review and approval prior to construction in order to assure compliance.

(I)

B. Plumbing installations must conform with provision of the State Plumbing Code.

HMH:ns

RESPONSE

35. Division of Health

A. The State of Utah requirement for approval of liquid waste disposal facilities, domestic water facilities, and construction camps has been supplemented in this section of the final statement. Compliance with existing regulations and construction codes does not require a specific action such as plan approval. For this reason, plumbing regulations and many other state and federal regulations are not discussed in the statement. The impact analysis assumes that the applicant would comply with all applicable state and federal health regulations.

B. As you point out, lime scrubbers within an efficiency of 90 percent are achievable under present technology. However, the applicant has proposed to install scrubbers with 80 percent efficienty on the sulfuric acid plant and the potassium sulfate plant. There are no federal emission standards for sulfur dioxide emissions from potassium sulfate plants, but the sulfur dioxide emissions from the sulfuric acid plant would be well below the federal emission standards (table 3-1). It can only be assumed that the applicant proposed to install scrubbers with an 80 percent efficiency for economic reasons.

C. The consultation and coordination between the applicant, the Bureau of Air quality, EPA, and BLM subsequent to the publication of the draft statement is summarized in Chapter 9 of the final statement. As a result of these discussions, the applicant has submitted a change in location of the plant site. This change would ensure compliance with Class III standards, and the necessary state and federal actions to reclassify the area from Class II to Class III have been added to Chapter 1 of the final statement.

D. The projected seepage from the tailings ponds is discussed on pages 3-28 and 3-30 of the draft. The projected seepage rate is 0.44 acre-feet per year per pond acre. The minimum recommended rate (0.25 inch per day) represents a seepage loss of 7.6 acre-feet per year per pond acre and the actual seepage rate is expected to be well below the recommended rate.

E. The proposed ground water monitoring program is described beginning on page 1-82 of the draft statement. The proposed monitoring program includes all the elements listed in the comment.

F. This required state action has been added to Chapter 1 of the final statement.

G. This required state action has been added to Chapter 1 of the final statement.

H. Please see response to comment "A" above.

I. Please see response to comment "A" above.

(36)

state of utah

DIVISION OF WILDLIFE RESOURCES

DONALD A. SMITH
Director

1596 West North Temple/Salt Lake City, Utah 84116/801 533-9333

RECEIVED
NOV 1 1976
STATE PLANNING OFFICE
STATE OF UTAH

November 16, 1976

Mr. Chauncey Powis, Chairman
Environmental Coordinating Committee
State Planning Office
118 State Capitol Building
Salt Lake City, Utah 84114

Dear Chauncey:

We have reviewed the Draft Environmental Impact Statement on Alunite. The general statement appears to be all right, and we are not opposing this project. However, we do have some comments which follow:

(A) Page 2-52, top paragraph: The comment about little rabbitbrush and snakeweed should be deleted. Our studies at the Desert Experimental Station indicate use on these plants by antelope.

(B) Page 2-58, 1st paragraph: This paragraph states low quality summer range is probably the limiting factor for deer; we agree. The concluding sentence implies predators and hunting pressure also are affecting deer numbers. However, there have always been predators, and hunting pressure has been declining since 1972. These latter two factors may currently be compounding with range conditions to suppress the ratio of recovery of these deer populations.

(C) Page 2-61, Antelope: Division records indicate antelope populations have fluctuated up and down for an undetermined time. Fawn mortalities have been studied off and on since the mid 1950's; yet, antelope numbers have increased and decreased without any noted changes in predator numbers. This question is not totally answered by predator-antelope population trends. The comment on predators should be deleted. The absence of fawns does not necessarily indicate predation.

(D) On the bottom of this page, the comment is made "none of the habitat is considered to be critical for any wildlife species." We question if one can take 1,000 acres of deer range and 2,200 acres of antelope range, add large numbers of people in the adjacent areas and say "not critical." We suggest the last sentence be deleted.

(E) Page 2-70, Hunting: The reason for the decrease in hunter success is the buck only regulation initiated for Unit 61C in 1974.

GOVERNOR
Calvin L. Rampton

DEPT. OF NATURAL RESOURCES
Gordon E. Harmston
Exec. Director

WILDLIFE BOARD
Roy L. Young, Chairman
Lewis C. Smith   Dr. Paul Stringham
Leland S. Swaner   Leslie J. Anderson

(F) Page 2-73, top paragraph: Chukar partridge should be added as "species hunted."

(G) Page 3-29, 2nd paragraph: It is essential for wildlife, particularly antelope and small animals, that Wah Wah Springs are not affected by the proposed development. If it is found they will be, alternative plans should be developed.

(H) Page 3-36, Water quality: The developer should be held accountable for any toxic materials dumped into intermittent streams.

(I) Page 3-43, 1st paragraph: The sentence, "Rabbitbrush has no forage value for livestock or wildlife," may be tempered by changing it to read, ... has little forage ...."

(J) Page 3-46, 1st paragraph: There is an indication that antelope will be forced to use ranges elsewhere in Wah Wah Valley. Antelope seek out black sagebrush areas but only if water is in reasonable proximity. We suggest mitigation through water developments (guzzlers) in sagebrush areas on B.L.M. lands.

(K) Page 3-46: It is inferred that implementation of the proposal would not result in loss of animals because they would move elsewhere. This is a very definite statement. It would be more accurate to say that, since wildlife is sparse and habitat appears to be limiting, loss of habitat prescribed in the proposal would have a significant effect on numbers. We are convinced that habitat limitations are determining wildlife numbers. Any loss in the future will, through natural processes, shift wildlife numbers downward.

(L) We believe the statement that approximately 30 deer and 15 antelope would have to move out of the area should be deleted. We know of no long term counts or trends to make these figures valid.

(M) Page 5-16, Habitat Losses: Competition would be during spring and summer, not in winter.

We hope these comments will be considered as we believe they will more accurately show the wildlife situation associated with this project.

Sincerely,

Donald A. Smith
Director

RESPONSE

36. Division of Wildlife Resources

A. A statement that little rabbitbrush and snakeweed are used by antelope has been added to the final statement.

B. The text has been changed to indicate the possible relationship between low quality summer range, hunting pressure, and predators.

C. The text has been changed to indicate that the reason for fluctuation in antelope populations has not been determined.

D. This comment was discussed with the Regional Game Manager and he recommended that the sentence be changed to indicate that the deer habitat was not classified as critical winter range rather than saying that it was not "critical for any species".

E. This statement has been added to the text of the final statement.

F. This upland game species has been added to the final statement.

G. As stated in the draft statement, there is no reason to believe that the flow of Wah Wah Springs would be affected by the proposal development.

H. Liability for damages resulting from toxic spills would have to be determined through state and/or federal judicial procedures. It can only be assumed that the applicant would be held accountable for damages that may result from toxic spills.

I. Concur. The text has been changed.

J. Water developments adjacent to sagebrush areas would certainly mitigate impacts to antelope. However, mitigating measures such as water developments and revegetation projects must be committed before they can be considered in an environmental statement. While it is likely that BLM could complete such projects in the future, it is not possible to obligate unappropriated funds and since a definite source of funds has not been identified, they cannot be considered as mitigating measures.

K. As stated on page 2-58 of the draft statement, summer range is probably the limiting habitat factor and the proposed action would not directly affect summer range. The type of habitat that would be removed is under-utilized and we believe that large herbivores would move to adjacent areas and that summer range would continue to be the major factor limiting population.

L. These figures represent estimates made by BLM field personnel and, as you state, there is no way to establish their validity. However, since the source of the estimates is given in the draft, it was felt that a rough estimate such as this would give the public some idea of the potential impacts of the proposed action. A statement indicating your objection to these numbers has been added to the final statement.

M. Since the proposed action would result only in the loss of winter range, there should be no increase in competition during the spring and summer months.

37

JOSEPH H. FRANCIS
COMMISSIONER

State of Utah
Department of Agriculture
Salt Lake City, Utah 84103

633-5421
AREA CODE 801

NOV 2
STATE PLANN
STATE OF

November 24, 1976

Mr. James Edwin Kee
State Planning Coordinator
118 State Capitol Building
Salt Lake City, Utah 84114

Dear Mr. Kee:

I had an opportunity to scan the environmental impact statement draft copy concerning the alunite mine southwest of Milford, Utah. There has surely been a lot of work directed toward this document and those responsible should be complimented on its preparation.

As I reviewed the material, I either missed or it was not included where you mention how the livestock operators in that area will be considered. You mention that you will need nearly 3,000 acres of the rangeland in that area for the mining program.

It would be very beneficial to the area if you would project in your program to provide funds for the improvement of rangelands outside of the area that you intend using for mining purposes. Thousands of acres of rangeland in that area can produce three or four times what it is now producing. An improvement of this type not only benefits and protects those people who are in the livestock business, but the entire community is strengthened and the rangeland is improved for the benefit of wildlife, reduced erosion and better quality of water as additional benefits to the livestock grazing. We would like to recommend that a rangeland development program be considered in your impact statement.

Sincerely,

UTAH STATE DEPARTMENT OF AGRICULTURE

Ben W. Lindsay

Ben W. Lindsay
Director of Agricultural Development

BWL:fp

RESPONSE

37. Department of Agriculture. Please see the response to a similar comment from the Soil Conservation Service in letter number 13.

Public hearings. A total of 14 people made oral comments at the hearings held in Milford and Salt Lake City. A majority of these people expressed general approval for the proposed project. Several others made comments on the adequacy of the draft statement and then submitted written comments which have been considered in the previous section. Several other people commented on the economic situation. It is not appropriate to respond to these comments in an environmental statement even though they will be considered in the decision-making process. Only one person made comments on the adequacy of the draft statement which were not included in a written statement. Only these comments will be considered in this section. An official transcript of the public hearings can be obtained by contacting Anderson Reporting, 228 Judge Building, Salt Lake City, Utah 84111.

Comments From Nina Dougherty, Sierra Club

Comment A. Since the project has the potential for being a significant source of air pollution, we are interested in what the emissions are estimated to be and in what control measures would actually be used. The time to establish necessary stringent requirements is before a project such as this is constructed, not afterwards. After construction, this project would dominate the economy of the area and the area would be subjected to the usual game of "If you make us do that, we'll have to close down".

Response A. The estimated emissions for the entire processing plant and the proposed central devices are summarized in table 3-2 on page 3-6 of the draft statement. It can only be assumed that the regulations controlling emissions and for the prevention of significant air quality deterioration would be enforced by EPA and/or the Utah State Bureau of Air Quality. The applicant would have to demonstrate that air quality standards would be met before the necessary permits to allow construction of the plant can be issued.

Comment B. It is disquieting that the expected emissions in some cases would be 100 percent of what is allowed under standards of performance for new stationary sources for alunite processing plants, and in other cases, would not only exceed Class II but also ambient standards. The only standards for the regulation of emissions of fluorides are the new source performance standards, since neither EPA nor Utah has issued ambient standards for that pollutant. It is quite disturbing that the fluoride emissions from 3 of the 4 processes emitting fluorides are planned to be 100 percent of the standard. Even if the fluoride emission controls were always operating at top planned efficiency (which would not occur), it is estimated that the maximum 24-hour fluoride concentration would far surpass the standards that the States of Washington and Montana have established. It is stated in the DES that the area in which such concentrations would occur would be small, ". . . about 5 square miles at most"; however, it is a fact that the area would be subjected to potentially toxic fluoride concentrations which could accumulate in vegetation over an extended period of time. There should be a discussion of the ways in which the fluoride emissions can be further controlled. It is difficult to believe that in this state with its concern about fluoridated water, there would not be equal concern about fluorides in the air.

Response B. It does not appear that it would be possible for emissions from the phosphoric acid, phosphate fertilizer, and aluminum fluoride plants to be any less than 100 percent of the emission standards with the best available control technology. These emissions are based on a 99.5 percent control efficiency, which would be achievable with the best presently available technology through a combination of gas absorber columns, Venturi scrubbers, and dry cyclones. The company would have to demonstrate that it could obtain this high efficiency before permission to start construction could be granted. Because emissions would be so close to the standard, close monitoring of emissions as well as concentrations of fluorides in the air would be required by the State. The fluoride problem would be alleviated somewhat due to the fact that the applicant has moved the location of the plant site about 1.5 miles further away from the mountains. This would result in lower ground level fluoride concentrations. With the new plant site, maximum annual and seasonal fluoride concentrations would fall below the 0.5 micrograms per cubic meter standard set by the State of Washington for the growing season, and long-term concentrations should not exceed the generally recognized threshold levels for damage to animals and vegetation.

Comment C. Another statement that causes us concern is the offhand apparent dismissal of the fact that 24-hourly particulate concentrations would exceed federal ambient air quality standards. The dismissal that this is anything that should be paid attention to is based on the fact that "observed high natural background concentrations" exist and that for that reason, the additional emitted particulates would cause the ambient standards to be exceeded. There is too much stress throughout of the "natural dust" or "natural background levels" as being something apparently to be ignored when adding up the particulate concentrations. We think otherwise. First of all, what are the causes of this natural dust? They are never identified. Secondly, they are particulates and do cause air quality problems--they cannot be ignored; they must be considered in concentration levels as much as any other particulate is.

Response C. The draft statement points out the fact that maximum 24-hourly particulate concentrations would exceed the secondary ambient air quality standards. There is no intent to justify or ignore the fact that these standards would be exceeded. The purpose of an environmental statement is to disclose potential impacts so they can be considered in the decision-making process. In response to several comments on the term "natural dust", we have reached the conclusion that "background particulate levels" would be more appropriate and this term will be used in the final statement. The fugitive dust problem will be considered in greater detail in the final statement.

Comment D. The third standard that would not be met would be Class II for sulfur dioxide and particulates. We do not accept that it is unimportant for these Class II standards to not be met, even the smallish area in which they would be exceeded. That area is currently Class II, and Class II standards must be met there. The DES should identify ways in which the standard can be met; there should be no assumption that the area is going to be reclassified as Class III.

Response D. It is agreed that it is mandatory that these standards be met. However, the primary purpose of the analysis in the draft statement is to assess the environmental impacts that would result from the proposed action. The fact that Class II standards would not be met must also be considered in the decision-making process. Since additional mitigation of air quality impacts at the original plant site is not possible, the applicant has moved the processing plant site about 1.5 miles further away from the mountains. At the new location, Class II standards could still be exceeded, but Class III standards would be met. The State of Utah is in the process of proposing that this area be reclassified to Class III. It is not known at the time whether this proposal will be approved by EPA.

Comment E. I have a few additional comments. Why isn't the alternative of just having an alunite processing facility considered? If the entire operation is contingent on the phosphate part, there should be more discussion of the impact of the mining and milling of the phosphate.

Response E. The alternative of not producing phosphate fertilizer at the proposed alunite processing plant site has been added to the final statement. This alternative will be considered in the decision-making process. The mining and milling of the phosphate rock in Idaho is being assessed in an environmental statement being prepared by the U.S. Geological Survey.

Comment F. There should be more discussion of the possibility of using nearby geothermal energy for the necessary power. The fact that the geothermal energy could be harnessed only 1 year after the facility is slated for operation can't be that much of a deterrent to considering its use.

Response F. The major reason that more discussion of geothermal power has not been included is that development of geothermal power is still uncertain at the present time, and the applicant must identify a known source of electricity and process steam. If geothermal power is developed and becomes available to the applicant, it would significantly reduce the atmospheric emissions of the proposed project. The impacts evaluated in the draft statement present the worst case and there is no reason why changes in the proposed project could not be made if such changes reduced environmental impacts.

Comment G. Where is the coal to come from? The source of coal needs to be identified.

Response G. Please see the response to the comment on the coal source in the letter from the National Park Service (letter no. 24).

Comment H. Also, in discussing the alternative of obtaining electricity from elsewhere rather than generating it onsite, it is stated that it would come from a transmission line. We tend to believe that the electricity, especially when we are speaking of 75 megawatts, must first be generated in a power plant. From which plant's capacity would the electricity come under this alternative?

Response H. The electricity would come from the Utah Power and Light energy network. The specific plant that would supply this power has not been determined. Federal agencies are in various stages of environmental analysis on a number of power plant proposals from Utah Power and Light. It is reasonable to expect that the environmental impacts associated with the generation of power for the alunite project would be included in the federal environmental statement process.

REFERENCE MATERIAL

APPENDIX A

Description of soil associations

Association 97. This association consists of 85 percent Typic Torrifluvents and 15 percent Typic Calciorthids. They are forming in material derived from basic and intermediate igneous and limestone rocks. Slopes range from 2 to 15 percent but are dominantly 3 to 7 percent. They occur at elevations ranging from 5,000 to 5,400 feet above sea level with some small areas ranging to 5,700 feet, on an easterly exposure. They are principally long alluvial fans.

The Torrifluvents are deep and moderately deep, gravelly, medium and moderately coarse textured soils.

The Calciorthids are deep, gravelly, medium and moderately coarse textured with a strong lime horizon occurring about 12 to 17 inches.

These soils have a water-holding capacity ranging from 4 to 10 inches in a 5-foot profile. The area is slightly eroded. Average annual precipitation is from 7 to 8 inches.

The vegetal cover consists of yellowbrush, winterfat, big sagebrush, rubber rabbitbrush, galleta, threeawn, Indian ricegrass, cheatgrass, and globemallow.

The soils in this unit occur in the Desert Loam and Desert Gravelly Loam range sites.

Association 99. This association consists of 75 percent Typic Calciorthids, 17 percent Typic Torrifluvents, 6 percent Typic Torripsamments, and 2 percent Lithic Torriorthents. They are forming on long, broad, alluvial fans from material derived from igneous and sedimentary rocks. Slopes range from 2 to 15 percent on an easterly facing aspect. Elevations range from 4,600 to 6,600 feet above sea level, primarily on broad alluvial fans and in alluvial coves with an easterly exposure.

The Calciorthids are deep and moderately deep, well drained, medium, moderately coarse and coarse textured with a weakly cemented lime horizon at about 14 to 20 inches. These soils are gravelly at about 16 inches and the texture is moderately fine; however, the weakly cemented horizon is present.

The Torrifluvents are deep and moderately deep, well drained, gravelly, medium to moderately coarse textured and highly stratified throughout. These areas are generally quite narrow.

The Torripsamments consist of areas of blow sand (dunes) particularly in the area of Sand Wash toward Snake Pass.

The Lithic Torriorthents are shallow, well drained, gravelly, and cobbly, with medium textured soil.

The moisture-holding capacity ranges from less than 2 inches for the Calciorthids and Lithic Torriorthents to 6 or 7 for the Torrifluvents for a depth of 5 feet. These soils are slightly to severely eroded. Average annual precipitation is 6 to 8 inches.

Vegetal cover is shadscale, winterfat, bud sagebrush, galleta, Indian ricegrass, cheatgrass, and halogeton with small percentages of black sage, kochia, horsebrush, rubber rabbitbrush, Brigham tea, globemallow, and squirreltail.

The soils in this association occur in the Desert Loam, Desert Gravelly Loam, Desert Sand and Desert Shallow Loam range sites.

Association 100. This association consists of 40 percent Xerollic Calciorthids, 20 percent Xerollic Haplargids, 20 percent Xeric Torrifluvents, 15 percent Lithic Xerollic Camborthids, and 5 percent rock outcrops. They are forming in material derived from acid, basic and intermediate igneous and sedimentary rock. Slopes range from 3 to 50 percent. Elevations range from 5,400 to 7,400 feet above sea level but are dominantly 5,440 to 6,800 feet, on rolling hills and mountain slopes.

The Calciorthids are deep, well drained, gravelly, medium and moderately coarse textured, with a strong lime horizon occurring at 18 to 24 inches; at some locations there are lime cemented hardpans that occur at depths of 10 to 15 inches.

The Haplargids are deep, well drained, medium textured and gravelly medium textured soils with a textured B horizon between 10 and 20 inches. These soils are predominantly on a north and northeast aspect.

The Torrifluvents are chiefly in small valleys and a few isolated small fans. They are deep and moderately deep, well drained and highly stratified.

The Lithic Camborthids are shallow, well drained, gravelly and cobbly with a B horizon at about 8 to 14 inches. They are generally on west and south aspects.

The water-holding capacity of these soils ranges from less than 2 to 7.5 inches for a depth of 5 feet. They have a moderate erosion hazard. The average annual precipitation is 8 to 12 inches.

Vegetal cover is big sagebrush, juniper, yellowbrush, blackbrush, black sagebrush, range ratany, Brigham tea, Indian ricegrass, squirreltail, galleta, needle and thread, Russian thistle, sand dropseed, and penstemon.

The soils in this association occur in Semidesert Loam, Semidesert Gravelly Loam and Semidesert Shallow Loam range sites. There are no range sites for rock outcrops.

Association 104. This association consists of 30 percent Lithic Torriorthents, 30 percent Typic Calciorthids, 10 percent Typic Torrifluvents and 30 percent rock outcrops. These soils are forming in material from limestone and basic intermediate igneous rocks. Slopes range from 10 to 60 percent with 10 to 40 percent predominating. Elevations range from 5,400 to 6,700 feet above sea level on all exposures. They occur on mountain slopes.

The Lithic Torriorthents are shallow, well drained, gravelly and cobbly and because of steep slopes are susceptible to erosion. They have a water-holding capacity of less than 2 inches.

The Calciorthids are moderately deep, gravelly, medium and moderately coarse textured and occur primarily on the west and southwest slopes. Erosion hazard is severe and water-holding capacity is 3 to 6 inches in a 5-foot profile.

The Torrifluvents are a very minor percentage in this association but generally are deep, well drained, gravelly, medium and moderately coarse textured with a water-holding capacity of 3.5 to 6 inches.

The average precipitation is 6 to 8 inches.

The vegetation consists of shadscale, black sagebrush, Brigham tea, galleta, and cheatgrass.

The soils in this association occur in Desert Gravelly Loam and Desert Shallow Loam range sites.

Association 122. This association consists of 15 percent Lithic Haploxerolls, 15 percent Lithic Argixerolls, 25 percent rock outcrops, 15 percent Argixerolls, 15 percent Calcixerolls, 10 percent Haplargids and 5 percent Torrifluvents. They are forming on mountain slopes in residuum and colluvium derived from igneous and sedimentary rock. The slopes range from 5 to 70 percent, but are dominantly 10 to 45 percent. Elevation is dominantly from 5,800 to 9,000 feet; a few rocky peaks extend to 9,600 feet.

The Lithic Haploxerolls are very shallow and shallow, well drained, gravelly and cobbly gritty, medium or moderately coarse textured with bedrock between 4 and 15 inches below the surface.

The Lithic Argixerolls are shallow, well drained, with a gravelly and cobbly medium textured surface soil, a gravelly and cobbly moderately fine textured B2t horizon, and bedrock between 5 and 20 inches below the surface.

The Argixerolls are deep and moderately deep, well drained, non-gravelly and gravelly moderately coarse and medium texture on the surface, gravelly, cobbly and stony moderately fine textured B2t horizons, gravelly, cobbly and stony medium and moderately fine textured C horizons, with the strong lime horizon forming between 8 and 23 inches below the surface.

The Calcixerolls are deep and moderately deep, well drained, very gravelly, gravelly, cobbly and stony medium and moderately coarse textured with the strong lime horizon occurring between 8 and 17 inches. Small areas of these soils have a lime cemented hardpan occurring between 18 and 21 inches.

The Haplargids occur on the lower mountain slopes, generally on south and west facing slopes and are severely eroded. They are deep and well drained, with a gravelly medium textured surface, gravelly medium to moderately fine textured B2t horizons, and weak carbonate accumulation on top of the bedrock which occurs between 27 and 36 inches below the surface. Some cobbles and stones occur in the profile in certain areas.

The Torrifluvents occur in narrow valleys. They are deep and moderately deep, well drained, gravelly and cobbly medium and moderately coarse textured.

The shallow and very shallow soils will hold about 0.5 to 2.5 inches of moisture and the deep and moderately deep soils will hold approximately 3 to 10 inches of moisture in a 5-foot profile. Three-fourths of the area is severely eroded and the rest is moderately to slightly eroded. The average annual precipitation ranges from about 12 to 20 inches.

The vegetal cover is mainly juniper, pinyon pine, big sagebrush, bitterbrush, snakeweed, Brigham tea, birchleaf mountain mahogany, curlleaf mountain mahogany, bluebunch wheatgrass, squirreltail, Indian ricegrass, threeawn, western wheatgrass, tall native bluegrass, cheatgrass, peavine, and pricklypear. At the higher elevations ponderosa pine, foxtail pine, white fir, and douglas fir occur.

Range sites are Upland Stony Hills (J.P.), Upland Shallow Loam, Upland Shallow Stony Loam, Upland Loam, Upland Gravelly Loam, Upland Loam (J.P.), Upland Gravelly Loam (J.P.), Upland Shallow Hardpan and Upland Stony Loam.

Association 127. This association consists of 55 percent Typic Natrargids and 45 percent Typic Torrifluvents. They are forming on alluvial alkali bottoms in mixed alluvium derived from igneous and sedimentary rocks. The slopes are 0 to 1 percent and elevations range from 4,850 to 5,480 feet above sea level.

There are small inclusions of: (1) Typic Calciorthids, north of Milford on the west side of the Beaver River channel, that are gravelly and nongravelly moderately coarse to moderately fine textured with the strong lime horizon at about 16 inches; (2) Typic Calciorthids, north of Milford about 18 miles, that are medium and moderately fine textured, strongly alkali, with a strong lime horizon occurring between 8 and 12 inches; (3) Typic Torrifluvents, about 12 miles north of Cedar City, that are deep, somewhat poorly and moderately well drained, stratified moderately coarse to moderately fine textured with big sagebrush, rubber rabbitbrush, alkali sacaton, saltgrass, and halogeton vegetal cover.

The Natrargids are deep, well and moderately well drained, calcareous, with a medium textured surface soil, moderately fine textured B2t horizon, medium to fine textured C horizons with a Bca horizon occurring between 7 and 12 inches below the surface. They are strongly to very strongly alkaline and in some places are strongly saline.

The Torrifluvents are deep, well and moderately well drained, calcareous, moderately to very strongly alkaline and in some places strongly saline, and medium and moderately fine textured.

These soils will hold about 4 to 11 inches of available water for a depth of 5 feet. There is slight and moderate erosion. The average annual precipitation is estimated to be 5 to 8 inches.

The vegetation is dominantly shadscale, greasewood, bud sagebrush, yellowbrush, cheatgrass, winterfat, and alkali sacaton.

These are Desert Flats, Desert Salt Flat, Alkali Bottoms and Desert Loam range sites.

APPENDIX B

Regional Plant Species List

SCIENTIFIC NAME	COMMON NAME
Grasses	
Agropyron dasystachyum (Hook.) Scribn.	Thickspike Wheatgrass
Agropyron desertorum (Fisch.) Schult.	Crested Wheatgrass
Agropyron intermedium	Intermediate Wheatgrass
Agropyron sibericum	Siberian Wheatgrass
Agropyron smithii Rydb.	Western, Bluestem Wheatgrass
Agropyron spicatum (Pursh) Scribn. & Smith	Bluebunch Wheatgrass
Aristida longiseta Steud.	Red Threeawn
Bouteloua gracilis (H.B.K.) Lag.	Blue Grama
Bromus tectorum L.	Cheatgrass
Distichlis stricta (Torr.) Rydb.	Saltgrass
Elymus cinereus Scribn. & Merr.	Great Basin Wildrye
Elymus salinus Jones	Salina Wildrye
Festuca octoflora Walt.	Sixweeks Fescue
Hilaria jamesii (Torr.) Benth.	Galleta
Hordeum jubatum L.	Foxtail Barley
Koelaria cristata (L.) Pers.	Junegrass
Oryzopsis hymenoides (R. & S.) Riker	Indian Ricegrass
Poa nevadensis Vasey	Nevada Bluegrass
Poa secunda Presl.	Sandberg Bluegrass

(continued)

SCIENTIFIC NAMES	COMMON NAMES
Shrubs (concluded)	
Sitanion hystrix (Nutt.) J.G. Smith	Squirreltail
Sporobolus airoides Torr.	Alkali Sacaton
Sporobolus cryptandrus (Torr.) Gray	Sand Dropseed
Stipa comata Trin. & Rupr.	Needle-and-Thread
Forbs	
Achillea millefolium L.	Yarrow
Amarnathus retroflexus L.	Redroot
Ambrosia acanthicarpa Hook.	Ragweed
Amsinkia intermedia Fisch. & Mey.	Fiddleneck
Arabis spp.	Rockcress
Arenaria kingii (Wats.) Jones	Sandwart
Argomone munita Dur. & Hilg.	Prickle Poppy
Asperugo procumbens L.	Catchweed
Aster spp.	
Aster arenosus (Heller) Blake	
Astragalus amphioxys Gray	Milkvetch
Astragalus lentiginosus var. araneosus (Sheld.) Barnbey	Locoweed
Astragalus lentiginosus var. salinus (Howell)Barnbey	
Astragalus marianus (Rydb.) Barnbey	
Astragalus pinonis Jones	

(continued)

SCIENTIFIC NAME	COMMON NAME
Forbs (continued)	
Astragalus platytropis Gray	
Astragalus straturensis Jones	
Astragalus tetrapterus Gray	
Brassica nigra (L.) Koch	Black Mustard
Calochortus nuttallii T. & G.	Sego Lily
Castilleja linariaefolia Benth. ex DC.	Indian Paintbrush
Chaenactis douglasii (Hook) H. & A.	
Chaenactis macrantha DC. Eaton	
Chenopodium album L.	Lambs Quarters
Cirsium arizonicum (Gray) Petrak.	Crimson Thistle
Cleome serrulata Pursh	Bee Plant
Comandra umbellata (L.) Nutt.	Bastard Toadflax
Corydalis aurea Willd.	Golden Corydalis
Crepis accuminata Nutt.	Hawks Beard
Cynoglossum officinale L.	Hounds Tongue
Cymopterus basalticus Jones	
Cymopterus jonesii Coult. & Rose	
Delphinium spp.	Larkspur
Descurainia sophia (L.) Webb.	Tansymustard
Eriogonum cernuum var. viminale (Stokes) Reveal in Munz	Buckwheat
Eriogonum corymbosum var. glutinosum (Jones) Jones	Buckwheat

(continued)

SCIENTIFIC NAME	COMMON NAMES
Forbs (continued)	
Eriogonum inflatum Torr. & Frem.	Buckwheat
Eriogonum maculatum Heller.	Buckwheat
Eriogonum nidularium Cov.	Buckwheat
Eriogonum ovalifolium Nutt.	Buckwheat
Eriogonum raceomosum Nutt.	Buckwheat
Eriogonum umbellatum Torr.	Buckwheat
Erysimum asperum DC.	Wallflower
Euphorbia fendleri Torr. & Gray	Spurge
Gilia aggregata (Pursh) Spreng.	Scarlet Gilia
Grindellia squarrosa (Pursh) Dunal	Gumweed
Halogeton glomeratus (Bieb.) C.A. Meyer	Halogeton
Helianthus annuus L.	Sunflower
Heterothecia villosa (Pursh) Shinners	Telegraph Plant
Hymenoxys richardsonii (Hook.) Cockerell	Hymenoxys
Iva axillaris Pursh	Poverty Weed
Langloisia setosissima (T.& G.) Greene	
Lappula occidentalis (Wats.) Greene	Stickseed
Lepidium perfoliatum L.	Pepper Grass
Leptodactylon pungens (Torr.) Nutt.	
Lithospermum incisum Lehm.	Stoneseed
Lomatium scabrum (Coult. & Rose) Mathias	Desert Parsley
Lupinus argenteus Pursh	Lupine

(continued)

SCIENTIFIC NAME	COMMON NAMES
Forbs (continued)	
Lygodesmia spinosa Nutt.	
Machaeranthera spp.	
Madia glomerata Hook.	Tar Weed
Marrubium vulgare L.	Horehound
Mentzelia albicaulis Dougl. ex Hook.	Blazing Star
Nicotiana attenuata Torr. ex Wats.	Wild Tobacco
Oenothera caespitosa Nutt.	Evening Primrose
Penstemon nanus Keck	Penstemon
Penstemon palmeri Gray	Penstemon
Penstemon spp.	Penstemon
Phlox hoodii Richards	Hoods Phlox
Phlox longifolia Nutt.	Longleaf Phlox
Polygonum aviculare L.	Prostrate Knotweed
Ranunculus testiculatus Crantz.	Bur Buttercup
Rumex crispus L.	Dock
Salsola kali L.	Russian Thistle
Sclerocactus pubispinus (Engelm.) Benson	
Sisymbrium altissimum L.	
Sphaeralcea caespitosa Jones	Low Globe Mallow
Sphearalcea grossulariifolia (H. & A.) Rydb.	Globe Mallow
Solidago sparsiflora Gray	Goldenrod
Swertia albomarginata (Wats.) Kuntze	Green-Gentian

(continued)

SCIENTIFIC NAME	COMMON NAMES
Forbs (concluded)	
Taraxacum officinale Weber	Common Dandelion
Townsendia florifer (Hook.) Gray	Townsendia
Vicia americana Muhl.	American Vetch
Zygadenus paniculatus (Nutt.) Wats.	Death Camus
Shrubs	
Allenrolfia occidentalis (Wats.) Kuntze	Pickleweed
Amelanchier utahensis Koehne	Utah Serviceberry
Arctostaphylos patula Greene	Manzanita
Artemisia arbuscula ssp. nova	Black Sagebrush
Artemisia spinescens DC. Eaton	Bud Sagebrush
Artemisia tridentata Nutt.	Big Sagebrush
Atriplex canescens (Pursh) Nutt.	Fourwing Saltbrush
Atriplex confertifolia (T.& F.) Wats.	Shadscale
Cercocarpus intricatus Wats.	Little-leaf Mtn. Mahogany
Cercocarpus ledifolius Nutt.	Curl-leaf Mtn. Mahogany
Cercocarpus montanus Raf.	Alder-leaf Mtn. Mahogany
Chrysothamnus depressus Nutt.	Rabbitbrush
Chrysothamnus greenei (Gray) Greene	Rabbitbrush
Chrysothamnus nauseosus (Pall.) Britt.	Rubber Rabbitbrush

(continued)

SCIENTIFIC NAME	COMMON NAMES
Shrubs (continued)	
Chrysothamnus visidiflorus (Hook.) Nutt.	Rabbitbrush
Cowania mexicana D. Don	Cliffrose
Ephedra nevadensis Wats.	Brigham Tea
Ephedra viridis Cov.	Brigham Tea
Eriogonum microthecum var. *laxiflorum* Hook.	Buckwheat
Eurotia lanata (Pursh) Moq.	Winterfat
Grayia spinosa (Hook.) Moq.	Spiny Hopsage
Gutierrezia sarothrae (Pursh) Britt. & Rusby	Broom Snakeweed
Haplopappus spp.	
Holodiscus dumosus (Nutt.) Heller	Rock-spiraea
Kochia americana Wats.	
Lycium andersonii	Wolfberry
Mahonia repens D. Don	Oregon Grape
Opuntia ssp.	Cactus
Petradoria pumila (Nutt.) Greene	
Purshia tridentata (Pursh) DC.	Bitterbrush
Quercus gambelii Nutt.	Gambel Oak
Quercus paucalobus	
Rhus trilobata Nutt.	Squaw Bush
Sambucus coerulea Raf.	Elderberry
Sarcobatus vermiculatus (Hook.) Torr.	Greasewood
Symphoricarpas utahensis Rydb.	Utah Snowberry

(continued)

SCIENTIFIC NAME	COMMON NAMES
Shrubs (concluded)	
Tetradymia canescens	Horsebrush
Tetradymia spinosa Torr. & Gray	Spiny Horsebrush
Trees	
Abies concolor Hoopes	White Fir
Juniperus osteosperma (Torr.) Little	Utah Juniper
Juniperus scopulorum Sarg.	Rocky Mountain Juniper
Pinus edulis Engelm.	Pinyon Pine
Pinus longaeva D.K. Bailey	Bristle-cone Pine
Pinus ponderosa Laws	Ponderosa Pine
Populus tremuloides Michx.	Quaking Aspen
Prunus virginiana L.	Chokecherry
Pseudotsuga menziesii (Mirb.) Franc.	Douglas Fir
Salix ssp.	Willow

APPENDIX C

Regional Animal Species List

SCIENTIFIC NAME	COMMON NAME	OCCURENCE
Mammals		
Ammospermophilus leucurus (Barnes)	Antelope Ground Squirrel	Regional Project Area
Antrozous pallidus pallidus (LeConte)	Pallid Bat	Regional
Antilocarpa americana americana (Ord)	Prong-horned Antelope	Regional Project Area
Bassariscus astutus nevadensis Miller	Ring-tailed Cat	Regional Project Area
Canis latrans lestes Merriam	Coyote	Regional Project Area
Cervus canadensis nelsoni Bailey	Elk, Wapiti	Regional
Corynorhinus rafinesquii pallescens Miller	Long-eared Bat	
Cynomys gunnisoni zuniensis Hollister	Zuni Prairie Dog	
Cynomys parvidens Allen	Utah Prairie Dog	
Dipodomys microps bonnevillei Goldman	Chisel-toothed Kangaroo Rat	Regional
Dipodomys ordii cinderensis Hardy	Ord Kangaroo Rat	Regional
Dipodomys ordii fetosus Durrant & Hall	Ord Kangaroo Rat	Regional
Eptesicus fuscus pallidus Young	Big Brown Bat	
Equus caballus	Horse	Regional Project Area

(continued)

SCIENTIFIC NAME	COMMON NAME	OCCURENCE
Mammals (continued)		
Erethizon dorsatum epixanthum Brandt	Porcupine	Regional
Eutamias dorsalis utahensis Merriam	Cliff Chipmunk	Regional
Eutamias minimus pictus (Allen)	Least Chipmunk	Regional Project Area
Felis concolor kaibabensis Nelson and Goldman	Mountain Lion	Regional Project Area
Lagurus curtatus intermedius (Taylor)	Sagebrush Vole	Regional
Lasionycteris noctivagans (LeConte)	Silvery-haired Bat	
Lasiurus cinereus cinereus (Beauvois)	Hoary Bat	
Lepus californicus deserticola Mearns	Black-tailed Jackrabbit	Regional Project Area
Lepus townsendii townsendii Bachman	White-tailed Jackrabbit	Regional Project Area
Lynx rufus pallescens Merriam	Bobcat	Regional Project Area
Mephitis mephitis major (Howell)	Striped Skunk	Regional Project Area
Microtus longicaudus latus Hall	Long-tailed Meadow Mouse	
Microtus montanus nexus Hall & Hayward	Montane Meadow Mouse	
Microdipodops megacephalus paululus Hall & Durrant	Dark Kangaroo Mouse	Regional
Mus musculus Linnaeus	House Mouse	

(continued)

SCIENTIFIC NAME	COMMON NAME	OCCURRENCE
Mammals (continued)		
Mustela frenata nevadensis Hall	Long-tailed Weasel	Regional
Myotis evotis evotis (Allen)	Long-eared Myotis	
Myotis lucifugus phasma Miller & Allen	Big Myotis	
Myotis subulatus melanorhinus (Merriam)	Small-footed Myotis	
Myotis volans interior Miller	Hairy-winged Myotis	
Neotoma cinerea	Bushy-tailed Wood Rat	Regional
Neotoma lepida lepida Thomas	Desert Wood Rat	Regional
Notiosorex crawfordi	Desert Shrew	
Odocoileus hemionus hemionus (Rafineaque)	Mule Deer	Regional Project Area
Onychomys leucogaster utahensis Goldman	Northern Grass-hopper Mouse	Regional
Ovis canadensis canadensis Shaw	Mountain Sheep	Regional
Perognathus formosus incolatus Hall	Long-tailed Pocket Mouse	Regional
Perognathus intermedius		
Perognathus longimembris gulosus Hall	Little Pocket Mouse	Regional
Perognathus parvus olivaceus Merriam	Great Basin Pocket Mouse	Regional
Peromyscus crinitus pergracilis Goldman	Canyon Mouse	Regional
Peromyscus maniculatus sonoriensis (LeConte)	Deer Mouse	Regional
Peromyscus truei nevadensis Hall & Hoffmeister	Pinyon Mouse	Regional Project Area

(continued)

SCIENTIFIC NAME	COMMON NAME	OCCURRENCE
Mammals (continued)		
Pipistrellus hesperus (Allen)	Western Pipistrelle	
Reithrodontomys megalotis megalotis (Baird)	Western Harvest Mouse	(continued) Regional
Sorex vagrans monticola Merriam	Vagrant Shrew	
Spermophilus lateralis trepidus	Golden Mantled Ground Squirrel	
Spermophilus townsendii mollis	Townsend Ground Squirrel	Regional Project Area
Spermophilus variegatus	Rock Squirrel	Regional Project Area
Spilogale gracilis saxatilis Merriam	Spotted Skunk	Regional
Sylvilagus audubonii arizonae (Allen)	Audubon Cottontail	Regional Project Area
Sylvilagus idahoensis (Merriam)	Pigmy Rabbit	Regional
Tadarida mexicana (Saussure)	Mexican Free-tailed Bat	
Tadarida molossa (pallas)	Big Free-tailed Bat	
Taxidea taxus taxus (Schreber)	Badger	Regional Project Area
Thomomys bottae centralis Hall	Botta Pocket Gopher	
Thomomys bottae wahwahensis Durrant	Southern Pocket Gopher	Regional Project Area

(continued)

SCIENTIFIC NAME	COMMON NAME	OCCURENCE
Mammals (concluded)		
Urocyon cinereoargenteus scottii Mearns	Gray Fox	Regional Project Area
Vulpes fulva macroura Baird	Red Fox	Regional
Vulpes macrotis nevadensis Goldman	Kit Fox	Regional Project Area

SCIENTIFIC NAME	COMMON NAME
Birds	
Recurvirostra americana	Avocet, American
Euphagus cyanocephalus	Blackbird, Brewer's
Agelaius phoeniceus	Blackbird, Red-winged
Xanthocephalus xanthocephalus	Blackbird, Yellowheaded
Sialia currucoides	Bluebird, Mountain
Sialia mexicana	Bluebird, Western
Calamospiza melanocorys	Bunting, Lark
Passerina amoena	Bunting, Lazuli
Parus gambeli	Chickadee, Mountain
Alectoris graeca	Chukar Partridge
Fulica americana	Coot, American
Molothrus ater	Cowbird, Brownheaded
Numenius americanus	Curlew, Long-billed
Zenaidura macroura	Dove, Mourning

(continued)

SCIENTIFIC NAME	COMMON NAME
Birds (continued)	
Columba livia	Dove, Rock
Haliaeetus leucocephalus	Eagle, Bald
Aquila chrysaetos	Eagle, Golden
Leucophoyx thula	Egret, Snowy
Falco peregrinus	Falcon, Peregrine
Falco mexicanus	Falcon, Prairie
Carpodacus mexicanus	Finch, House
Carpodacus purpureus	Finch, Purple
Colaptes auratus	Flicker, Red-shafted
Polioptila caerulea	Gnatcatcher, Blue-gray
Spinus tristis	Goldfinch, American
Spinus psaltria	Goldfinch, Lesser
Branta canadensis	Goose, Canada
Pheucticus melanocephalus	Grosbeak, Black-headed
Hesperiphona vespertina	Grosbeak, Evening
Centrocercus urophasianus	Grouse, Sage
Larus delawarensis	Gull, Ring-billed
Accipiter cooperii	Hawk, Coopers
Buteo regalis	Hawk, Ferruginous
Circus cyaneus	Hawk, Marsh
Falco columbarius	Hawk, Pigeon
Buteo jamaicensis	Hawk, Red-tailed

(continued)

SCIENTIFIC NAME	COMMON NAME
Birds (continued)	
Buteo lagopus	Hawk, Rough-legged
Accipiter striatus	Hawk, Sharp-shinned
Falco sparverius	Hawk, Sparrow
Buteo swainsoni	Hawk, Swainson's
Gymnortinus cyanocephaia	Jay, Pinyon
Aphelocoma coerulescens	Jay, Scrub
Junco hyemalis	Junco, Dark-eyed
Junco caniceps	Junco, Gray-headed
Junco oreganus	Junco, Oregon
Charadrius vociferus	Killdeer
Megaceryle alcyon	Kingfisher, Belted
Tyrannus tyrannus	Kingbird, Eastern
Tyrannus verticalis	Kingbird, Western
Regulus calendula	Kinglet, Ruby-crowned
Eremophila alpestris	Lark, Horned
Pica pica	Magpie, Black-billed
Sturnella neglecta	Meadowlark, Western
Mimus polyglottos	Mocking Bird
Chordeiles minor	Night Hawk, Common
Chordeiles acutipennis	Night Hawk, Lesser
Sitta carolinensis	Nuthatch, White-breasted
Sitta canadensis	Nuthatch, Red-breasted

(continued)

SCIENTIFIC NAME	COMMON NAME
Birds (continued)	
Icterus galbula	Oriole, Bullocks
Speotyto cunicularia	Owl, Burrowing
Bubo virginianus	Owl, Great Horned
Asio otus	Owl, Long-eared
Contopus sordidulus	Peewee, Western Wood
Phasianus colchicus	Pheasant, Ring-necked
Sayornis nigricams	Phoebe, Black
Sayornis saya	Phoebe, Says
Phalaenoptilus nuttallii	Poorwill
Corvus corax	Raven, Common
Turdus migratorius	Robin
Sphyrapicus varius	Sapsucker, Yellow-bellied
Lanius ludovicianus	Shrike, Loggerhead
Spinus pinus	Siskin, Pine
Amphispiza bilineata	Sparrow, Black-throated
Spizella breweri	Sparrow, Brewer's
Chondestes grammacus	Sparrow, Lark
Amphispiza belli	Sparrow, Sage
Passerculus sandwichensis	Sparrow, Savannah
Spizella arborea	Sparrow, Tree
Pooecetes gramineus	Sparrow, Vesper
Zonotrichia leucophrys	Sparrow, White Crowned

(continued)

SCIENTIFIC NAME	COMMON NAME
Birds (concluded)	
Sturnus vulgaris	Starling
Riparia riparia	Swallow, Bank
Hirundo rustica	Swallow, Barn
Stelgidopteryx ruficollis	Swallow, Rough-winged
Tachycineta thalassina	Swallow, Violet-green
Petrochelidon pyrrhonota	Swallow, Western Cliff
Piranga ludoviciana	Tanager, Western
Toxostoma lecontei	Thrasher, LeConte
Oreoscoptes montanus	Thrasher, Sage
Ixoreus naevius	Thrush, Varied
Vireo gilvus	Vireo, Warbling
Cathartes aura	Vulture, Turkey
Dendroica auduboni	Warbler, Audubon's
Oporornis tolmiei	Warbler, MacGillivray's
Oporornis petechia	Warbler, Yellow
Wilsonia pusilla	Warbler, Wilson's
Bombycilla garrula	Waxwing, Bohemian
Asyndesmus lewis	Woodpecker, Lewis
Telmatodytes palustris	Wren, Long-billed Marsh
Salpinctes obsoletus	Wren, Rock

SCIENTIFIC NAME	COMMON NAME
Reptiles and Amphibians	
Bufo woodhousei	Woodhouse's Toad
Cnemidophorus tessellatus	Desert Whiptail Lizard
Crotalus viridis lotusus	Great Basin Rattlesnake
Crotaphytus collaris baileyi	Western Collared Lizard
Crotaphytus wislizenii	Leopard Lizard
Eumeces skiltonianus	Skilton's Skink
Hypsiglena ochrorhynchus	Spotted Night Snake
Lampropeltis pyromelana	Arizona King Snake
Phrynosoma platyrhinos	Desert Horned Lizard
Pituophis catenifer deserticola	Great Basin Blow Snake
Rhinocheilus lecontei	Long-nosed Snake
Scaphiopus intermontanus	Great Basin Spadefoot Toad
Sceloporus graciosus graciosus	Sagebrush Swift
Sceloporus occidentalis bi-seriatus	Western Blue Bellied Lizard
Thamnophis orinoides vagrans	Wandering Garter Snake
Uta levis	Cliff Uta
Uta stansburiana stansburiana	Stansbury Lizard

APPENDIX D

Calvin L. Rampton
Governor

1896

Burton L. Carlson
State Planning
Coordinator

STATE OF UTAH
Office of the
STATE PLANNING COORDINATOR
118 State Capitol
Salt Lake City, Utah 84114
(801) 533-5245

April 26, 1976

Ernest Eberhardt
Bureau of Land Management
Box 729
Cedar City, Utah 84720

Dear Mr. Eberhardt:

As you know, the cost of preplanning for a large scale development imposes a considerable cost upon the county or municipality doing the planning. All too, frequently these costs contribute to the reluctance to properly plan, resulting in the disorder which has become symbolic of the western mining boomtown. Because of the problems usually associated with implimenting an adequate preplanning process one of the serious impacts of large scale development is the overloading of existing capabilities to properly plan.

The needs assessment work on public services and socio-economic impacts associated with the development of alunite in Beaver County has been carefully evaluated by the public officials of Beaver County and its municipalities. The vehicle for the early planning and needs assessment is the Beaver County Planning and Development Council. This organization has pooled the expertise from state and federal agencies, colleges and universities, Earth Sciences and Alument Companies, and the staff and consultant of the Association of Government.

Cooperation and contribution of time and effort by the agencies and organizations assisting the Beaver County Planning and Development Council has provided the areas public officials with an understanding of the potential socio-economic impacts associated with the Alunite development and the mitigating measures required to minimize their adverse effects.

The structure of the Beaver County Planning and Development Council provided valuable public official input and understanding of issues as well as excellent needs, assessment and preplanning all at a remarkably low cost to the county. I would encourage the use of this process in other areas of major proposed development. Additionally, I believe the process followed by the Beaver County Planning and Development Council should be considered one of the major socio-economic mitigating measures for impacts associated with the development of alunite resources in Beaver County.

Sincerely,

Dave Conine
Planner

APPENDIX D

ALUNITE ANNING & DEVELOPMENT COUN
BEAVER COUNTY
State of Utah

FRED B. HARRIS
CHAIRMAN

THURMAN F. EYRE
COUNTY COMMISSIONER

STANLEY C. ROBERTS
COUNTY COMMISSIONER

NICHOLAS R. DOTSON
CLERK AND AUDITOR

RONDO T. FARRER, TREASURER

ROBERT BRUCE BROWN, RECORDER

MAX LIMB, ASSESSOR

DALE NELSON, SHERIFF

JOHN O. CHRISTIANSEN, ATTORNEY

Beaver, Utah
April 21, 1976

Mr. Ernie Eberhard
Alunite Team Leader
Environmental Project Office
P. O. Box 851
Cedar City, UT 84720

Dear Mr. Eberhard:

We appreciate the request of the Environmental Project Office for a community and county response to identified socio-economic impacts related to the Alunite Project. It is our understanding that you wish the Planning & Development Council to coordinate the responses from Beaver County and related communities.

Your letter requested information on community views relative to specific impacts and concerns which may be generated by the project. Our responses to this request will relate directly to those areas identified in your letter of March 24. Reference will also be included on action planned or underway which we feel is directly related to your request for inputs.

The attached response statement was prepared under the direction of the Planning & Development Council. Prior to the submittal of the statement it was reviewed and approved by each local government subdivision referred to in its content. The statement was reviewed, revised, and approved by the Planning & Development Council at a meeting held on April 21, 1976.

It is hoped that the statement will provide the Alunite Assessment Team with the responses needed from the community to facilitate completion of the Environmental Impact Statement. If your office has any questions concerning the statement, its preparation, or content, please contact us.

Again, we extend our appreciation for the opportunity to provide a community response on the potential impacts identified by the Assessment Team.

Sincerely,

Fred B Harris

Fred B. Harris, Chairman
Planning & Development Council

Att.

I. GENERAL MITIGATION ACTION

Beaver County and impacted communities have planned and initiated a general mitigation measure in response to the Alunite Project and related socio-economic issues. This mitigation measure is the Alunite Planning and Development Council. The membership of this Council consists of representatives from the County, impacted communities, state and federal agencies, legislature, and development companies. (See Attachment I for list of membership.)

The purpose of the Council is to function as a framework which:

1. Provides for regular communication and cooperation between local governments in Beaver County and industry on information, planning and development of mutual interest, relative to the Alunite Project.
2. Functions as a communication and coordination linkage with state and federal agencies relative to industrial growth in Beaver County.
3. Guides and facilitates the assessment of current and future problems and impacts related to industrial growth in Beaver County and recommend alternatives which might be considered for their solution.
4. Initiates a process to facilitate community input and education related to industrial development in the County.
5. Assists communities or the County with industrial development related functions as requested.

The objective of the Council is not to direct or assume the responsibilities of communities or the County. It is to facilitate communication and cooperation, and assist local governments to understand and prepare for the potential impacts of growth related to the Alunite Project in Beaver County.

II. PLANS TO REDUCE INCREASED TRAFFIC VOLUME

Our assessment of traffic volume in Beaver County generated by the project was accomplished through the State Department of Transportation.

That assessment points up the following:

1. A maximum of 3,600 daily trips generated by both construction and operations workers traveling to and from the Alunite Project would not have significant impact on the local highways outside the Milford City area. Those highways in the vicinity of the project and between the cities of Milford, Minersville, Beaver, and Cedar City are now operating well below their capacity of approximately 2,000 vehicles per hour, and would continue to do so through both the construction and operations phases of the project.

2. As the number of heavy trucks and volume traveling SR-257 and SR-21 increases, there will be some accelerated pavement deterioration both in the sub-surface and surface pavement layers.

   The pavement condition will be monitored by state forces to provide pavement life expectancy data and to identify those areas of potential pavement failure. Under the Resources and Development Act, funds could be expended to upgrade those areas of potential pavement failure.

3. If traffic patterns remain the same in Milford and population increases as projected, peak hourly volumes would reach the level at which they become congested and turning or parking movements would be very difficult, necessitating widening Main Street to four lanes or constructing additional routes.

   Right-of-way through Main Street is only 50 to 60 feet, and if the highway were widened to four lanes, it would cause severe restrictions to downtown commercial activities, and there would be no parking.

   Mitigating Measures - Planned

   A. Proper advanced planning in developing new housing areas, shopping centers, schools, etc., will be initiated to minimize future traffic congestion problems and provide an adequate transportation system to serve those areas.

   B. In those areas that are to be expanded, early zoning and purchase of right-of-way will be accomplished to insure that Milford City can expand in a planned and orderly fashion.

   C. As more detailed advanced planning is accomplished by Beaver County and Milford City, the State Department of Highways will cooperate in the development of a specific plan to redirect and/or improve traffic flow and management in and around Milford City.

4. Initial assessment indicates that a mass transit system between the project site and Milford City could impact traffic volume problems. While early conversations with the developing companies indicate they do not plan to provide these services, they would be willing to subsidize a private mass transit system. Feasibility of such a system will be further assessed and studied as a part of the advanced planning phase of the project.

III. EXISTING UTILITIES IMPROVEMENT

Specific assessments have been conducted on the water and sewage systems of communities in the project impact area. The results of these assessments and mitigating measures planned by these communities are as follows:

Milford City - Water System

Present Situation

Based on projected population and distribution, the Milford water system, as it now exists, would be incapable of meeting the projected impact due to the Alunite Project unless improvements and expansions are constructed.

1. The existing wells have a reported yield of 1,713 gallons per minute. Based on historical peak per capita usage in Milford of 700 gallons per capita, and an estimated 3.5 persons per connection, the existing wells should be adequate for approximately 1,000 connections. Therefore, the population can almost double before a water supply problem is encountered (provided that all wells were functioning properly). In order to provide sufficient water for the full impact of the project, the water supply may need to be increased between 40 and 100 percent, depending upon actual population growth.
2. Based on existing standards, the storage system is inadequate for the present population. In order to bring the existing system up to standard (800 gallons of storage per connection per day and fire flow of 1,500 gallons per minute for four hours) approximately 800,000 gallons of storage may be required. To meet future growth due to the Alunite Project, a total storage of between 1.6 and 2.3 million gallons may be required (based on 800 gallons per day per connection and fire flows ranging between 2,200 and 2,700 gallons per minute for four hours).
3. The existing distribution system is presently in need of expansion and repair and a metering system should be installed.

Mitigating Measures - Planned or Underway

1. The City is now advertising for bid improvements on its water distribution system. Approximate cost is $250,000.
2. The people of Milford have approved a bond issue of $340,000 to improve the water distribution system and storage.
3. Preliminary engineering evaluation of the water source situation indicates that increased water supply can probably best be achieved by development of additional wells. However, potential sources of water will be studied in more detail in Phase II of the community's advanced planning effort.
4. A water distribution system improvement project has been designed and has been scheduled for construction the summer of 1976. The project will provide a major large diameter loop around the existing system. This improvement will provide a basic framework from which future additional development could branch to meet expansion and growth demands.
5. The community intends, as indicated by the passing of the bond issue referred to above, to plan and develop a storage improvement program to meet existing and future requirements. Installation of a metering system

will also be accomplished by the City as a part of its long range improvement program. It is anticipated that the cost of providing the additional storage water supply and new transmission and distribution lines could be financed mainly by developers of future subdivisions.

6. Ordinances and codes recently adopted by the City were prepared to facilitate effective management of expansion and growth to ensure that the most effective use of water and sewage systems might be assured.

Milford City - Sewage System

Present Situation

The existing sewage system consists of the following elements: collection, Imhoff Tank, outfall, and containment lagoon.

The collection and Imhoff Tank were constructed some years ago. The outfall and treatment system were constructed in 1974 to reduce the health hazard created by the effluent. The outfall system has a lift station consisting of two pumps capable of pumping 600 gpm. The treatment system consists of total containment lagoons with a designed load capability for 2,000 population equivalent.

Based on projected population and distribution anticipated from the Alunite Project, the present system may become inadequate after two years of growth impact.

Mitigating Measures - Planned or Underway

1. A sewage lagoon system was completed in 1975 which was engineered to support a population of 2,000. The City has purchased property adjacent to this system to enlarge these facilities as it becomes necessary.

2. The City of Milford has made application for grant money in the amount of $20,000 to have a major sewage improvement and facility plan completed.

Minersville - Water System

Present Situation

The present system consists of springs, an old well (not in operation), and a new well (drilled but not equipped).

The town has water rights in the following amounts: springs - 1.0 cfs (448.8 gallons/minute); well - .59 cfs (265 gallons/minute).

The springs flow has varied in recent years from 350 gpm to 150 gpm. The low flow occurs during the late summer months when demand for use is high. A new well has been drilled, bids have been received to install equipment capable of producing 300 gpm, and installation of a pipeline to connect the well into the existing system has taken place.

The present storage capacity is 180,000 gallons, which is provided by two reservoirs: one with a capacity of 35,000 gallons and the other 145,000 gallons.

With the expansion of the new well, the town water system will meet the Utah State Division of Health requirements for the present connections.

Mitigating Measures - Planned or Underway

1. The town contracted Coon, King & Knowlton Engineers to prepare a report on water system improvements in 1975. This report includes improvements required to meet the projected demands created by the Alunite Project as well as improving the system to meet present requirements.

   Since the development of the Alunite Project was uncertain, the improvement program proposed expansion in phases, with Phase I being designated to meet current needs. This phase has been funded and is in the process of construction.

   Phase II of the expansion program provides for additional storage capacity, equipment to increase the flow from the well, and distribution lines to allow for expansion created by the Alunite Project. Phase III would further expand the distribution system if the need occurs due to growth.

   It is the intent of the community to move forward on this improvement program as need demands and funding may be identified to support development.

2. The new well developed by the City was designed and drilled to meet requirements created by projected Alunite related growth impacts.

Minersville - Sewer System

Present Situation

The town of Minersville is disposing of sewage by individual septic tanks and drain fields. There have been problems experienced with the present system, and it is considered inadequate.

Mitigating Measures - Proposed

1. The community is currently planning to correct existing problems as soon as funding support can be arranged. Minimum improvements required to meet standards in the development of a collection and outfall system would assure a capacity adequate to meet projected growth impacts from the Alunite Project.

   The only additional costs or improvements required to meet Alunite impact would be the enlarging of the lagoon system. The major cost to the community will be to meet existing need.

2. It appears that existing state priorities of the State Division of Health relative to EPA funding support of communities for sewage system planning and development may be adjusted in the Spring of 1976. Minersville has not been high enough on the priority list to receive funding assistance to this point. It is anticipated that these expected adjustments will move Minersville much higher on the priority list for assistance.

Beaver City - Water System

Present Situation

The present system consists of a collection system of springs and wells with water rights of 2,684.79 AF plus 41.52 cfs.

The flow is not measured at the sources so the amount received from each source is unknown. The combined flow is 2,800 gpm (6.24 cfs), which exceeds the delivery capacity of the present system. The system is capable of delivering water to 100 additional connections.

The water right capability of the existing system is more than adequate to meet long range anticipated growth impacts resulting from the Alunite Project. The delivery capacity of the system may have to be increased by the fourth year of the Project to meet projected growth alternatives.

The present storage is 200,000 gallons and does not meet the Utah State Division of Health requirements for the present connections.

Mitigating Measures - Proposed

1. The City has initiated a program to use funds received from sale of water to operate and expand the system. Expansion completed to date has been directed toward improvement of the distribution system which will provide for additional delivery capability.

Beaver City - Sewage System

Present Situation

Population and distribution projections, including the Alunite Project, indicate that Beaver City may increase in a size range of from 2,111 to 2,409 by 1995. The present sewage system of the City has the pumping capacity to serve 2,000 people. The lagoon system is designed to meet the requirements of 2,700 people.

Mitigating Measures

1. To meet short and long range growth impacts projected for the City, it will only be necessary to increase the pumping capacity of the system. The City has indicated its willingness to provide for these improvements to the system as it becomes necessary.

IV. PLANS TO MEET EDUCATION RELATED IMPACTS

Based on population and distribution projections and the assessment accomplished on the educational system in Beaver County, the following mitigating measures are anticipated:

1. All school facilities in Beaver County are presently operating below maximum capacity. Our assessment indicates that anticipated student growth could be absorbed for the first two years of the project by increasing teaching staff and accomplishing minor structural adjustments at the high school site in Milford.

2. Maximum growth impacts would be anticipated in the third year of the project. Impact *may* require that new secondary and elementary facilities be constructed in Milford. This increase in facilities would enable the school system to meet long range projected demands in Milford.

3. By the beginning of the fourth year of the project, structural adjustments may be necessary in Minersville facilities to enable them to meet long range demands.

4. Impact on the Beaver County School District will require additional teaching, supervisory, and classified personnel.

Administration of the School District has stated that it will be prepared to accomplish additional advanced planning and development to meet these impacts, and has identified preliminary alternatives to accomplish this task.

5. It should be emphasized that the State Legislature in its 1976 Session provided for funding mechanisms to assist school districts to plan and prepare for growth impacts generated by industrial development. These mechanisms included:

   - Legislation permitting development companies to prepay sales and use taxes for construction of schools as they are needed.

   - Legislation appropriating excess Federal Revenue Sharing funds to the State Board of Education for critical school building needs.

V. POLICE AND FIRE PROTECTION

Assessment of the police and fire protection services within Beaver County indicate that expansion in these programs will be necessary. The following improvement measures are being planned or are underway which will mitigate project related impacts on these services.

Fire Protection

To improve the provision of fire protection services, Beaver County and related communities have proposed to:

1. Establish two special fire protection districts.

   - Two special service districts will be established in the County with the power to levy taxes. One will include the east portion of the County with Beaver City and the second will include the west portion of the County with Milford.

   - Public hearings must be held on the proposal and it must be voted on by residents of the County. Preparation of the proposal for hearings is under way, and it will be on the ballot this fall.

   - Informal acceptance of the proposal has been made by an existing special service district south of Milford. This district has agreed to dissolve with the passage of the two-district proposal.

   - By establishing these special districts, a funding base will be defined. The County will then be in a position to provide significant financial support to the three existing volunteer departments. The inability of the County to contribute adequate funds to support the communities' efforts has been an undermining factor in the cooperative provision of fire protection services to date.

2. Beaver City has a very active volunteer fire department. The department has a clearly defined program for enhancing fire protection services which include:

   - Recent acquisition of a new high capacity pumper unit.
   - Completion and installation of citywide hydrant system.
   - Present development of more efficient dispatching system.
   - Proposed construction of fire station and hiring of full-time employees to manage facility and maintain equipment.

3. With the adoption of the proposed county service area proposal, the consolidation of fire protection services in Milford should serve to improve the volunteer department where the volunteers from both departments can provide a joint effort.

   - Monthly classes are being held in the city to train volunteer firemen.
   - The city has recently facilitated training of six individuals as Emergency Medical Technicians making a total of nine trained individuals in the community.

4. Lack of funding support has restricted Minersville Fire Protection Services development to date.

   - If sufficient funds are available through the proposed special district arrangement, Minersville will consider the purchase of their own fire truck since they are currently relying on U.S. Forest Service equipment which must respond to Forest Service calls first.

Police Protection

All the local law enforcement agencies in the County share the problem of inadequate funds. If and when funds become available, all agencies have specific plans to expand their departments, both in terms of manpower and equipment.

- The Beaver County Sheriff's Office is actively seeking funds to purchase an off-road vehicle which is necessary to properly serve much of the county. Immediate personnel plans include one full-time and one part-time jailer and office help to free the officers of related time-consuming record keeping.
- The Beaver City Police Department priority proposes to expand its total force to provide 24-hour coverage. This will require the hiring of two more full-time officers.

- Milford's Police Department priority is to expand its force by an additional two officers.
- Minersville has no defined plans for expansion of police services at this time but will further study needs as a part of advanced planning related to the Alunite Project.

VI. NEW HOUSING DEVELOPMENT AND MANAGEMENT

Our assessment of the Housing in Beaver County indicates that the County or communities cannot absorb additional population in the existing inventory of any significant scale. Additional new housing will be needed to provide for both the construction and operational phases of the project.

To mitigate the potential impacts created by the lack of existing housing, the County and communities have planned or initiated the following action:

1. Upgrading and adoption of residential regulations to insure their adequacy to protect the public interest and to provide a suitable living environment as anticipated large scale growth progresses. (See Section VIII of this information for specific action proposed in this area.)
2. It is anticipated that mobile housing will be most suitable during the construction phase of the project. However, local public officials will encourage the development of multi-family housing attractive to developers, wherever possible, without sacrificing public interest. There is not a significant supply of multi-family housing in the County or communities presently, and a variety of housing choices will be needed to meet the magnitude of anticipated population growth.

   Development of areas to support mobile homes will also be planned to facilitate their transition to multi-family building areas in later years.
3. The County and communities will work cooperatively to inform financial institutions which could be sources of mortgage credit to the area, of the magnitude and perpetuity of the anticipated growth and the nature of the income produced by the project so that credit patterns can be established where they do not presently exist in the County.
4. Federal and state housing assistance program will be studied in Phase II of advanced planning as a potential source to mitigate problems created by the rising economic base on fixed income residents. These programs are not presently available in Beaver County.
5. High priority will be placed on cooperative action by the County and communities to use ordinances and codes as a mechanism to guide development to urban areas where services are available, particularly during the early years of the project. Every effort will be directed to carrying out Phase II advanced planning in housing and services development to prevent the creation of scattered, fragmented settlements in unincorporated areas which cannot provide services.

   The objective will be to avoid potential County-community competition in the planning and delivery of residential and public services.

6. The Special Services District mechanism will be studied jointly by the County and communities as a mechanism to generate and provide adequate funding to support residential and public services development.

VII. PLANNING EFFORTS TO ALLEVIATE ADVERSE IMPACTS

It is the position of the Planning and Development Council and participating government subdivisions that advanced planning to alleviate anticipated adverse impacts must be accomplished in two phases. In Phase I anticipated adverse impacts should be identified and assessed. In Phase II more intensive advanced planning should then be directed, on a priority basis, to prepare for or mitigate negative impacts.

The Planning and Development Council has initiate a socio-economic assessment of the following community services related areas:

- Population and Distribution
- Land Use Characteristics
- Housing
- Water
- Sewer and Waste
- Health
- Education
- Roads and Transportation
- Ordinances and Codes
- Public Services and Revenues
- Employment and Manpower
- Soils

Each of these assessment areas has been reviewed and discussed by the Council to facilitate community leader understanding of potential impacts and cooperative decision making relative to further advanced planning and development efforts which will be required in the area. The assessment elements will be compiled into a report for use by the County and each community. It is anticipated that the assessment phase of the Council's work will be completed in early May. The Council will then identify alternative mechanisms to accomplish Phase II advanced planning, and recommend action that the County and communities should initiate to continue preparation efforts.

VIII. CONTROL OF EXPECTED GROWTH

Specific planning efforts and actions have been accomplished to impact anticipated problems related to expected growth.

1. The City of Milford has adopted zoning, subdivision, mobile home ordinances, and the 1973 Uniform Building Code. Assessment review of these ordinances codes indicated they are more than adequate to facilitate control of anticipated growth impact in the community.

2. Other city ordinances of Milford were revised in 1968 and are presently being revised again.

3. Existing county ordinances have been assessed and specific recommendations prepared in relation to (1) voids and problems in existing ordinances; (2) alternatives which the County might implement to correct ordinance problems; and (3) a process the County might follow to update and adopt a revised ordinances and codes program.

   The County Commission and Planning Commission have reviewed this assessment and recommendations, and are now in the process of determining the specific alternative which the County should initiate to complete a revision and updating of its ordinances and codes. The County is now in the process of negotiating a contract with a planning consultant to assist in the preparation, revision, and adoption of a set of ordinances and codes. It is anticipated with this planning assistance that this effort will proceed to its completion in the near future.

   The approach selected by the County to complete this task will carefully consider the current status of each of the communities in relation to ordinances and codes.

4. Beaver City adopted a mobile home ordinance in 1974 and the 1973 Uniform Building Code.

5. Minersville has not adopted ordinances and codes as of this date. The Community is now preparing to initiate action to begin the process of preparing and adopting a set of ordinances and codes.

6. Through its assessment activities, the Planning and Development Council has studied and discussed the following:

   A. Ability of the County and communities to control expected growth by the adoption and enforcement of effective zoning, subdivision and mobile home ordinances, and building codes.

   B. Present status of County and communities in relation to existing and current ordinances and codes.

   C. Need for a cooperative and supporting effort among the County and communities to establish a 'growth management' mechanism through ordinances and codes.

This study and related discussions have emphasized that the County and each community must adopt common objectives relative to the adoption of ordinances and codes. Further, that the ordinances and codes adopted must be compatible with and supportive of common growth management objectives among related local government subdivisions. The County and impacted communities have committed to prepare and/or adopt ordinances and codes that meet these objectives as soon as may be possible.

LIST OF ABBREVIATIONS

General

BLM	Bureau of Land Management
BYU	Brigham Young University
CCD	Census County Divisions
CDM	Climatological Dispersion Model
FES	final environmental statement
DWR	Division of Wildlife Resources
ES	environmental statement
EPA	Environmental Protection Agency
ESI	Earth Sciences, Inc.
GTSP	granular triple superphosphate
MFP	Management Framework Plan
ORV	off-road vehicle
UPLAND	Utah Process Land Use and Tax Base
URA	Unit Resource Analysis

Units of Measure

AUM	animal unit month
kV	kilovolt
MGD	million gallons per day
ppb	parts per billion
ppm	parts per million
$\mu g/m^3$	micrograms per cubic meter

Chemical

$A\ell F$	aluminum fluoride
$A\ell_2O_3$	aluminum oxide (alumina)
$A\ell_2O_3\cdot 3H_2O$	alumina hydrate
HF	hydrogen fluoride
H_2SO_4	sulfuric acid

(continued)

Chemicals, (cont.)	
$KA\ell_3(OH)_6(SO_4)_2$	hydrous potassium aluminum sulfate (alunite)
KOH	potassium hydroxide
K_2SO_4	potassium sulfate
NO	nitric oxides
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
O_3	ozone
SiF_4	silicon tetrafluoride
Si_2F_6	silicon difluoride
SO_2	sulfur dioxide
SO_3	sulfur trioxide

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